The
# Electrical Review

VOL. CVIII. FEBRUARY 20, 1931. No. 2778.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 5871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom £1 14s. 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to E.R. (1930) LTD., and crossed "Lloyds Bank, Law Courts Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

## Contents:


| | PAGE |
|---|---|
| How to Cheapen Supply | 313 |
| "Electrical Review" | 314 |
| The Benevolent Executive | 314 |
| Sir Charles Parsons, O.M. | 314 |
| The E.R.A. | 314 |
| The I.E.E. Dinner | 315 |
| Fuel or Flue-gas Treatment | 315 |
| The Fair in Progress | 315 |
| Overseas Electrical Trade | 315 |
| The Saskatoon Power Station, by F. H. Fullerton (*illus.*) | 316 |
| The Electric Sign, by J. M. Woolnough (*illus.*) | 318 |
| Lead Sheaths for Cables, by N. A. Allen (*illus.*) | 321 |
| The Domestic Consumer, by R. H. Rawll | 328 |
| Electricity on Ships | 324 |
| High-voltage Measurement | 325 |
| Street Lighting, by C. C. Paterson | 326 |
| Parliamentary Notes | 326 |
| Fractional H.P. Motors (*illus.*) | 327 |
| The I.E.E. Dinner | 327 |
| Legal | 328 |
| The Research Association | 328 |
| Business and Industrial Notes | 329 |
| Lighting and Power Notes | 332 |
| Tramway and Railway Notes | 333 |
| Telegraph and Telephone Notes | 334 |
| Radio Notes | 334 |
| Contract Information | 335 |
| Forthcoming Events | 336 |
| Notes | 337 |
| Our Personal Column | 339 |
| Financial Section— | |
| New Companies Registered | 341 |
| Official Returns of Electrical Companies | 341 |
| City Notes | 342 |
| Stocks and Shares | 343 |
| Our Foreign Electrical Trade | 345 |
| The British Industries Fair—II (*illus.*) | 346 |
| Exhibits at Olympia, London | 353 |
| Selected Radio-telephone Apparatus (*illus.*) | 354 |
| New Electrical Devices, Fittings, and Plant (*illus.*) | 355 |
| Electric Coal-cutters | 356 |
| Correspondence— | |
| Electrolysis and Rubber | 357 |
| Birmingham's Frequency Change | 357 |
| Registered Electrical Contractors | 357 |
| The City and Guilds Examinations | 358 |
| Electric-furnace Elements | 358 |
| The Benevolent Institution Committee | 358 |
| Careers for Young Engineers | 358 |
| Interference with Wireless Sets | 358 |
| Safety in Earthing | 358 |
| Wages in the Electrical Contracting Industry | 359 |
| Published Specifications | 359 |
| Trade Mark Applications | 359 |
| New Work for Contractors | 360 |


# How to Cheapen Supply.

ONE of the periodic campaigns for reductions in charges for electricity is now being actively prosecuted. Into the particular merits of the campaign now afoot we do not propose to enter, except to remark that the question is not so easy of solution as it might appear to those without an inside knowledge of the diverse factors that have to be taken into account when framing tariffs.

Our own views on the general subject have often been stated. They are that low rates will justify themselves commercially in addition to securing the goodwill of consumers in the carrying out of a public service. The term "low rates" should, however, be qualified by considerations of their applicability to different purposes, having regard to the necessity of giving the greatest encouragement to increased consumption; hence the paramount importance of a suitable tariff.

A sound tariff will not please everybody. We have even seen it stated that a two-part tariff will not benefit the consumer who wishes to use electricity for a few lamps only. It will not and should not. The cost of giving supplies to such consumers paying even more than the highest rates actually charged has often to be borne in part by the long-hour consumers.

Most complaints come from residents in outlying districts. We believe that low rates common to a whole area will generally be commercially justifiable if the supply authority has an urban undertaking to bear the standing charges during the period of development, but the same consideration does not necessarily apply to an undertaking without the centre core of a town's load. This means that urban consumers must be expected for the time being to pay something towards the cost of supplying electricity to those in thinly populated areas. It is probable that in time they will benefit by the broad policy, but it obviously does not give those who prefer the amenities of a country or an outer-suburban life any right to demand the same terms as those from whom the undertaking derives most of its *net* revenue.

Our chief concern, however, is to note the disproportionate emphasis laid on cheap lighting rates, a matter of little moment compared with the supreme importance of low charges for "other uses." One would have much more respect for the attitude of the campaigners if they had made the chief cause of complaint the impossibility of taking full advantage of electricity in their houses with high cooking and heating rates. A high lighting rate even has its advantages if a two-part tariff be offered as an alternative, as it may make the latter attractive without the necessity of allocating some of the standing charges to the running charges, a procedure that penalises the better consumer and hinders development.

Comparison is also made between the average prices charged by different undertakings. This may be entirely misleading, as average price depends largely on the load-factor of the consumers, and by no means indicates equit-

able treatment of any particular class, or even between members of the same class. Another point that should be mentioned here is the cost of providing adequate service to consumers. Prompt attention to their requirements (not only complaints) entails expense, but the requisite organisation is an essential condition of progress. It may be that this additional expense is reflected in slightly higher charges for electricity than would otherwise be the case, but consumers should not grudge paying for so inestimable a boon. The complexity of the problem of tariff making was pointed out in our opening paragraph, but it is hardly reasonable to expect consumers to appreciate the difficulties of a supply undertaking in this respect; it seems to us that a little trouble taken in the early stages to secure their confidence and goodwill would go a long way towards removing misunderstandings, as was pointed out by SIR H. FRANK HEATH at the E.R.A. lunch referred to elsewhere in this issue.

That is one aspect of the case. It is open to our readers to prove from statements in this journal that reasonable lighting rates are by no means incompatible with low heating rates, that certain very small undertakings are prosperous in spite of tariffs favourable to their consumers, that extra-urban populations do enjoy charges at which they can take full advantage of a supply of electricity, and that undertakings giving the best service are often those in which the price of electricity is lowest. The chief point we wish to make, however, is that a cheap and abundant supply of electricity will be feasible if it is cheap only to those who use it in abundance.

---

**"Electrical Review."**

As announced in our columns a fortnight ago, Mr. G. H. Alabaster and Mr. E. A. Gatehouse have disposed of their family interests in the ELECTRICAL REVIEW to the Associated Iliffe Press. Our readers may take it, however, that this does not indicate any change of policy whatever. The whole of the existing organisation, with the exception of the two gentlemen named, will continue to carry on the REVIEW at the old address and on the lines which have already commended themselves to so many; but with those advantages which must follow from association with Messrs. Iliffe, whose experience in and facilities for the production of technical journals are second to none. Legal formalities necessitate the voluntary liquidation of the old Company and the formation of a new one, "E.R. (1930) Ltd.," on the board of which Mr. A. H. Bridge, the Commercial Editor, and Mr. E. S. Middleton, the Manager and Secretary of the old Company, have seats; while Mr. C. O. Brettelle, M.I.E.E., will continue to be the Technical Editor.

---

**The Benevolent Executive.**

WE wish to direct special attention to the letter from CAPTAIN J. T. KEEPING which appears in our "Correspondence" columns to-day. Everybody electrical should be more or less interested in the excellent work of the Electrical Trades Benevolent Institution. It has had a warm place in our heart ever since we were present at its initiation, and it always will do so while it continues in excellent hands and is so carefully administered. But the control of a fund of £50,000 and the wise examination of and discrimination between the manifold claims made upon it in the course of a year make a heavy demand upon the time and thought of busy men. So far the Association has known little lack of worthy men willing to carry these heavy responsibilities, but it is not a duty that should be left too long with any man. It is not fair to him and perhaps it is not best for the fund. Furthermore, if those who pay the piper should be allowed to call the tune, it is right that the desire for the governing body to be as representative as possible of the whole industry should be met. Captain Keeping asks for nominations for the seats on the Council which become vacant this year, and it is hoped that a goodly number of "members" of the Fund will attend the annual meeting in April and advance suggestions for furthering E.T.B.I. interests. To provide funds for a benevolent purpose is a very important duty; let it not be supposed that therein alone lies the responsibility of some of our readers. This particular moment may be one of call to special men to be willing to come forward infusing new blood into the organisation.

---

**Sir Charles Parsons, O.M.**

FEW engineers have made so great an appeal to the public imagination as the late SIR CHARLES PARSONS, and it seems probable that his name will, rightly we think, be linked with those of Watt and Stevenson as a pioneer of a new era in applied science. While to the majority his fame rests chiefly upon his successful adaptation of the steam turbine to marine propulsion, to electrical engineers he will be remembered chiefly for his work in developing the turbo-alternator, a work which was an indispensable factor in making practicable the supply of electricity on a large scale. It is fitting here to mention an activity of Parsons which, while not of the same direct interest to our readers, reveals another facet of his scientific curiosity. We refer to his contribution towards the improvement of optical glass, in which respect, as *The Times* recently showed, this country now takes the premier position. Mention should also be made of his services during the war as a member of the Central Committee of the Board of Invention and Research, particulars of which were given by SIR J. J. THOMSON in a letter to *The Times*.

A prophet is not always without honour in his own country, and it is good to know that recognition of Parsons' genius came during his lifetime. In addition to his knighthood he had the distinction of being the first engineer to be awarded the Order of Merit; he was also the first engineer to receive the Faraday Medal, and he was paid honour in many forms by the principal scientific bodies and universities. The benefits from Parsons' work were not, of course, confined to his native land, and the international character of science is never so apparent as when some great mind is taken from us. The references in other countries to the loss incurred by the death of Parsons must not be looked upon merely as tokens of courtesy exchanged between civilised communities. They must be taken as expressions of a very real sympathy, using the word in its real sense of "suffering with." His life's work will, it is true, earn the admiration of other nations and will, without doubt, promote a greater respect for and understanding of the country of his birth, but the loss in the removal of one who was still actively engaged in investigating the problems awaiting solution in the field of high-pressure and high-temperature steam is one common to all peoples.

---

**The E.R.A.**

LAST Friday's luncheon on the occasion of the tenth annual meeting of the British Electrical and Allied Industries Research Association (a report of the speeches at which will be found elsewhere in this issue) served as a reminder, if any were really needed, of the general expansion of the Association's activities in practically all its sections, the excellence of the work carried out having been fully maintained.

Whilst at the end of 1929 the Association was faced with the necessity of retarding important researches for lack of funds, the conferences that were convened to consider ways and means testified to E.R.A.'s value so influentially as to alleviate financial anxiety materially, a pleasing feature being the renewal, on a liberal scale, of support by H.M. Department of Scientific and Industrial Research. The manufacturers, on whom the burden chiefly lay for years, increased their share and the electricity supply side of the industry undertook largely to increase its support according to a definite scale of contribution, though it is a matter for concern

that many undertakings do not seem to appreciate the necessity of all parties contributing on equal terms.

The steady increase of support which has been forthcoming will for the first time for many years enable a programme more nearly in accordance with the requirements of the industry to be contemplated. Two of the subjects urgently in need of further investigation are circuit-breaking and dielectric phenomena. With respect to the former, research contemplated and the prospective demand from manufacturers for tests have been estimated to justify the establishment of a testing station with a minimum short-circuit capacity of a million kilovolt-amperes; its capital cost would be not less than one-quarter of a million sterling, but E.R.A.'s numerous important discoveries lying fallow for the lack of adequate development facilities make it earnestly to be desired that means may be devised in the immediate future for financing the scheme which has been prepared. With respect to dielectrics, cellulose acetate seems to promise much; indeed, its application as a plastic coating for tapes for cable insulation on board ship, where the conditions are notoriously onerous, seems to have been more generally satisfactory than any other type of insulator hitherto used for that purpose.

---

**The I.E.E. Dinner.**

THE I.E.E. dinner was, as usual, a most enjoyable function, and under this heading is certainly included the subsequent reunion. The Connaught Rooms were just large enough to accommodate in comfort the 701 members and guests present. This figure compares with the number of approximately 650 on the last occasion, which itself was an increase over any previous year.

The president took advantage of the opportunity to press home the necessity for an intimate alliance between science and engineering. It seems impossible to doubt that MR. C. C. PATERSON's eloquence will, in a year when the example of Faraday is in the minds of all, have an effect on the general attitude towards the subject he has so much at heart. If so, his claim that the Institution gives vision to the industry will be amply justified.

The Minister of Transport, it is pleasing to note, showed no repentance for his strenuous advocacy of electrical development. His offence, as we have previously pointed out, is that he looks after the interests of his department in a particularly energetic and efficient manner. Similar well-directed enthusiasm would be welcome as a general feature, not only in Government Departments, but even in the electrical industry itself. MR. H. MORRISON enjoys the benefits of an electric house and, incidentally, sets a good example even to some electrical engineers. The gas companies, in giving wide publicity to this matter, have very ably supported the efforts of the electrical Press to spread the gospel.

The Minister stated that he had no desire to injure the gas industry. This view is entirely in harmony with our own, as the vigorous conduct of that industry is a constant stimulus to our own. At the dinner of the Illuminating Engineering Society reported by us last week, SIR JOHN BROOKS gave some figures regarding the rate of increase of gas used for public lighting. This increase has not been at the expense of electricity, and, in places where electricity may be substituted hereafter for gas, the amount sold for the same purpose and the standard of illumination demanded will be far greater than they would otherwise have been.

---

**Fuel or Flue-gas Treatment.**

IN our Notes columns in this issue we publish some reported views of a fuel expert bearing on the question of smoke nuisance in connection with power stations, and in the light of the attention that is being given to the subject at present the views expressed are of more than usual interest. It is suggested that sufficient consideration has not been given to the possibilities of removing or neutralising the offending impurities before, rather than after, combustion, and one is led to believe that the cost of washing and crushing the raw coal, so as to eliminate excess ash, sulphur, and other impurities, would be less costly overall than that of subjecting the effluents to "scrubbing" processes.

Attention is also drawn to the particularly encouraging results which are being obtained as the result of the sandwich system of firing for stoker-fired plant, and it is shown that a 50 per cent. admixture of coke breeze to bituminous coal containing 28 per cent. volatile combustible gives a total volatile content only about the same as that of Welsh smokeless coal. We were much impressed by the clean stacks during a visit to the Deptford stations of the London Power Co., when they were operating normally with a 50,000-kW load.

It seems likely that pulverised-fuel and stoker firing may each warrant a different method of treatment, and we have already been led to ask, when commenting on measures adopted to overcome the dust trouble in connection with p.f. firing: "will the expense involved materially affect the cost of p.f., as compared with stoker plant?"

We are not at this stage prepared even to suggest which are the best methods of attack, but we do earnestly suggest that in endeavours to solve the main problem every possible avenue should be searched without prejudice. Public opinion has become involved, and that should be the main issue of guidance. We urge supply engineers to accept the proved solution when it appears, so as not to risk any degree of hold-up in the major business of supplying electricity. Commercial efficiency in its broadest sense must govern thermal efficiency.

---

**The Fair in Progress.**

THE British Industries Fair opened in London and Birmingham on Monday last and is now at its busiest period. According to official reports the attendance of both home and overseas buyers reached record figures during the first two or three days. Speaking at the Government banquet at the Guildhall on Monday evening, the Duke of Gloucester very ably stated the case for the Fair—its nature, its effects, and the essential part which it now plays in our export trade. We should like all our readers to be convinced of its efficacy and interest to traders in all branches of industry. While our notes are published with this end in view, we feel that only personal inspection can bring a proper realisation of the facts.

No doubt many readers went to Birmingham yesterday (Thursday), which was the first "electrical" day. Those who did not should make an effort to see the Fair next week—if possible on Tuesday, when a number of further electrical organisations will be making an "official" inspection.

---

**Overseas Electrical Trade.**

THE January Board of Trade returns, from which we quote in this issue, show that both inward and outward trade reached a level considerably below that of the first month of last year. The decrease was general, all sections being affected, with two minor exceptions in the export trade list.

A certain measure of encouragement may be drawn from the fact that electrical exports, although well below the 1930 value, did not decline to such an extent as most other classes. This is apparent when the decrease of 35 per cent. in the total is compared with that of 28 per cent. in the value of exported electrical goods and machinery.

On the other hand electrical imports fell by about 40 per cent., although the general import total was only 25 per cent. lower than that of January, 1930. In spite of this the balance in our favour was reduced from £822,823 to £689,580.

It is to be hoped that the British Industries Fair, with its strong electrical section, will so stimulate both home and export trade as to restore the balance to its former level, or, indeed, raise it to a higher one.

# The Saskatoon Power Station.

**Some particulars of the first 400 lb. per sq. in. installation in Western Canada carried out by the Saskatchewan Provincial Government.**

By F. H. FULLERTON.

THE new power station at Saskatoon, Saskatchewan, fig. 1, has the distinction of being the first public utility station in Western Canada, and the second in the entire Dominion, designed for operation at a steam pressure of 400 lb. per sq. in.

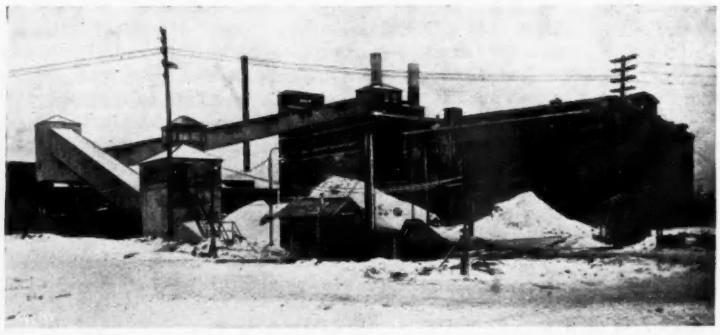


**Fig. 1.—View of Power Station and Coal Yard.**

The initial installation of the new plant includes one Parsons 10,000-kW, 3,600-r.p.m. turbo-alternator, figs. 4 and 5, a 750-kW station auxiliary turbo-alternator, and two Stirling-type boilers equipped with superheaters, forced-draught gear, chain-grate stokers, and air preheaters. The steam conditions at the boiler stop valves are 400 lb. per sq. in. and 735 deg. F. Electrical generation is at 13,200 volts, 3-phase, 60 cycles, and the 60-kW exciter is directly coupled. Scott-connected transformers have been provided between the 2,200-volt, 2-phase bus-bars in the old plant and the new 13,200-volt, 3-phase bus-bars. The transformers (fig. 3) will be connected so as to deliver at 2,200 V, 2-phase and 3-phase, simultaneously. Electrical distribution at the present time is at 2-phase, 2,200 volts, but the existing system will be replaced in the future with 3-phase, 2,200-volt and 13,200-volt circuits.

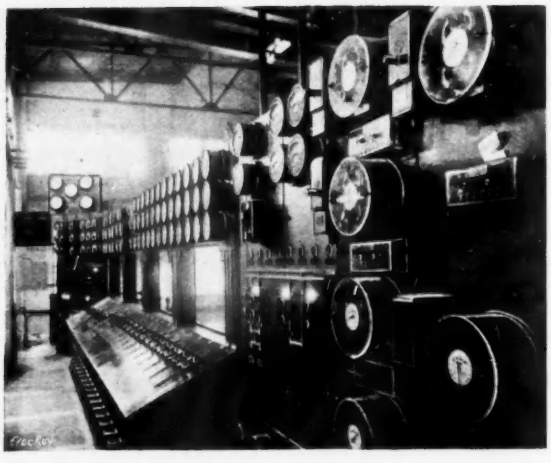


**Fig. 2.—Main Control Switchboard for Old and New Stations.**

A surface condenser of approximately 10,000 sq. ft. (with two condensate pumps and two steam jet air-removal units) will handle 85,000 lb. of steam per hour when supplied with 11,600 g.p.m. of circulating water. The cooling medium for condenser service will be taken from the Saskatchewan River at a point approximately 300 ft. from the turbine-room building. The pump house will be located on the river bank, and will also contain duplicate circulating-water pumps of approximately 13,000 g.p.m. capacity each, a screen-spray pump, a raw-water pump for general station service, and two travelling water sreens. Water will be taken from the river at a point approximately at mid-stream to the screen house through two open-ended 36-in. cast-iron bell and spigot intake pipes 150 ft. in length. A discharge well for condenser discharge water has been constructed at the south-east corner of the pump-house structure.

The steam generating units consist of two 10,630-sq. ft. Stirling boilers, each of a capacity of 85,000 lb. per hour, and equipped with " Elesco " super-heaters, Ljungström air preheaters, and twin-unit 8 ft. by 20 ft. chain-grate stokers, with a partition wall between them, approximately 24 in. in thickness and about 8 ft. in height. During low steam demand periods only one of each set of two stokers will be operated. Cast-iron ash hoppers with special hard-burned refractory brick linings will receive ashes discharged by the stokers.

A Berquist-type steel-plate bunker, with concrete lining, applied with a cement gun, has been erected over the firing aisle for the storage of coal, and an 8-ft. section of the bunker at the north will be used for ash storage. On account of the severe winter weather, the ash bunker is installed inside the boiler house to prevent the wet ashes from freezing.

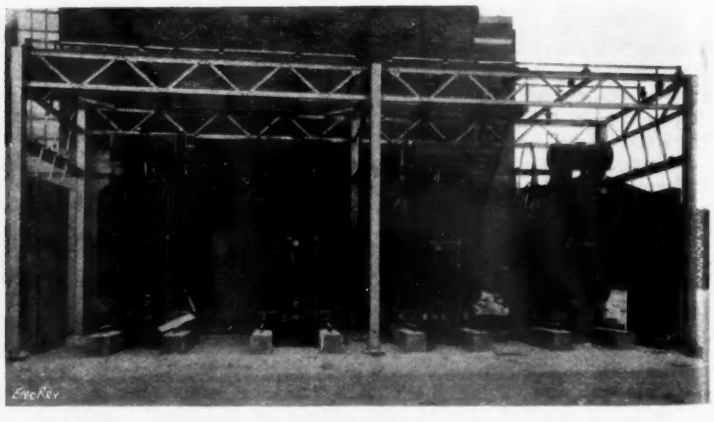


**Fig. 3.—Scott-connected Main Power Transformers.**

Air for combustion will be supplied by one forced-draught fan for each boiler, having a capacity of

32,000 cu. ft. per min., against a static pressure of 7 in. of water, and air will be heated in its passage from the fan to the stoker by the Ljungström preheater, which contains 10,000 sq. ft. of heating surface. Gases will be removed from each boiler through the preheater and discharged to the stack by an induced-draught fan against a static pressure of 7 in. of water. A separate

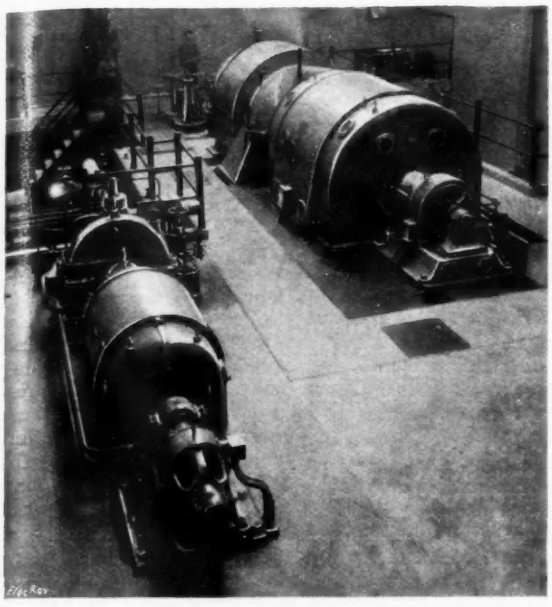


**Fig. 4.—Engine Room, showing 10,000-kW and 750-kW Turbo-generator Sets.**

stack has been provided for each boiler. The boiler furnaces have been specially designed for the burning of low-grade Alberta coal having a high moisture content and a heat value of from 8,000 to 10,000 B.th.u. per lb. The front and rear stoker arches are of the water-wall type, equipped with Bailey furnace blocks. At the front end of the stoker refractory suspended arches have been provided below the water-cooled arch tubes in order to provide radiant heat for ignition of the green coal as it is delivered by the stoker to the combustion chamber. All walls, except the front and rear arches, are of solid firebrick construction.

The feed-water system includes the following major items of equipment: two motor-driven Weir boiler feed pumps, 300 g.p.m. capacity; one steam-driven Weir boiler feed pump, 300 g.p.m. capacity; one Elliott low-pressure extraction heater; one Elliott high-pressure extraction heater; one Elliott deaerator; one Wheeler single-effect evaporator.

The design of the feed-water heating system for the Saskatoon power plant has been arranged for operation with two-point steam extraction from the main turbine unit. The pressure range of the lower bleeding point will be 3 lb. absolute to 19 lb. absolute, while the range of pressure of the higher point will be from 12 lb. absolute to 90 lb. absolute, corresponding in each case to turbine loadings of from 1,000 kW to 10,000 kW.

The low extraction point on the main turbine will supply steam to a low-pressure heater for heating condensate discharged from the main condenser, while the higher steam extraction point will supply steam to the deaerator, the evaporator, and the high-pressure heater. The high-pressure heater will heat the boiler feed water as it flows from the boiler feed pumps to the boiler. The condensate and heating returns and drips, together with the necessary distilled water make-up, will be discharged to the deaerator, which operates at a constant pressure of 20 lb. per sq. in. absolute, and will be capable of heating 110,000 lb. of water per hour from 219 deg. F. to 228 deg. F., and of reducing absorbed gases to a maximum of 0.03 cu. cm. of oxygen per litre of discharged water.

The evaporator consists of a single-effect unit with an automatic feed valve and by-pass, automatic oil drain, and a continuous blow-down system. The evaporator will furnish the distilled make-up boiler feed water from either the Saskatoon city water or raw water taken from the Saskatchewan River, and under normal conditions it will operate on steam extracted from the main turbine and discharge to the deaerator. Under low-load conditions, when evaporator vapour pressure falls below the deaerator operating pressure, the vapour will be condensed in the low-pressure heater. In the event of abnormal demand for distilled water, or when the 10,000-kW unit is not in operation, steam for evaporator service can be supplied from the 150-lb. auxiliary steam header.

The coal-handling system includes a track hopper, consisting of a concrete substructure for the accommodation of a steel-plate hopper with a single outlet, which discharges the coal as it is unloaded from cars through a suitable hopper gate and automatic feeder to a crusher. After passing through the crusher the coal is automatically delivered to an inclined belt conveyor. Normally, the coal will be unloaded from railroad cars and transported direct to the boiler plant.

Of interest in connection with the station service is the fact that the 750-kW auxiliary generator may be run as a "spinning" unit. Vacuum will be maintained in the turbine casing through a 2-in. valved line connected to the main condenser in order to reduce windage of the turbine wheel when the generator is operated as a motor. The steam end of the machine is equipped with the usual governor and throttle valve; in addition, an electrically-operated valve is inserted in the main steam lead, and the governor arm is equipped with a set of contacts to control the motor-operated valve. The governor, during spinning operation, will be set at a value of approximately 57 to 58 cycles, and in case of system disturbances causing the main generating unit to drop its frequency below 57 or 58 cycles, the governor arm contacts will close, causing the main steam lead valve to open, thereby rendering the unit available for supplying the station auxiliaries.

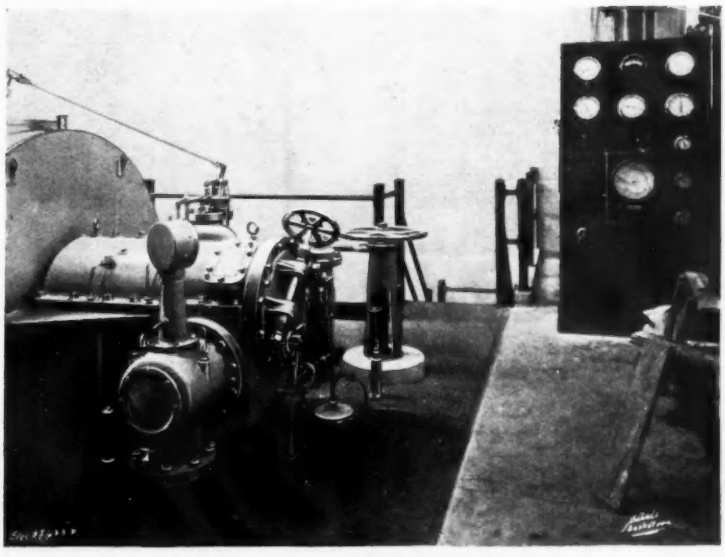


**Fig. 5.—Steam End of 10,000-kW Set.**

Approximately 125 tons of coal per day are required to operate the new plant, compared with 225 tons per day with the old plant, but during summer months the coal requirements are reduced to about three-fifths.

# The Electric Sign.

**Some Notes on its Construction and Installation, and its Potentialities as a Business Builder.**

By J. MONTAGUE WOOLNOUGH.

*Chairman, Electrical Section, Master Sign Makers' Association.**

NO aspect of illuminating engineering is so well worthy of study at the present time as electric signs—or to use a more generic expression—electrical advertising. There is in this field a vast scope for development in all directions, accompanied by an advancing technique that has already simplified practice to a degree at which it is almost as easy to deal with the sale of an electric sign as with the sale of a household fitting. Yet this great field is sadly neglected by those for whom it should provide a large and steady revenue. Electricity supply authorities, electrical contractors, and distributors generally are apathetic in their attitude towards electrical advertising, possibly because they have yet to realise in full what it means to them. For supply authorities it means an increased demand at reasonable rates. For contractors it means profitable business, usually in fairly large single orders from people of established reputations.

**The Travelling Exhibition of Signs.**

In an attempt to create public interest in electrical advertising, and at the same time to show supply authorities and contractors the possibilities of this market, a mobile exhibition of electric signs, organised by the Master Sign Makers' Association in conjunction with the Electrical Development Association, has recently completed a nine weeks' tour of the country. The exhibition, which is illustrated on this page, has done much to improve the outlook of electrical interests in the towns which it has visited, but it has simply paved the way, and its work must be followed up. However, those contractors who did take sufficient interest to use the exhibition as a method of interesting customers in electrical advertising have, I believe, every reason to be satisfied, and can see what is to be made out of selling signs if they go at it in the right way.

Now, why is it, with this market at their doors, that most electricity supply authorities and contractors do not take as much interest in an electric sign worth £50 as they do in a domestic fitting worth 50s.? For my own part I consider it is lack of knowledge. The sign trade has been in the hands of a few specialists, and is not sufficiently understood by the ordinary contractor. I hope to show in this article that, by co-operating with a good sign manufacturer, any contractor or authority can sell electric signs as easily as one can sell electric kettles. Such problems as determining the size of lettering, the nature of the message, shape, and viewing distance can be solved quite easily if a few simple rules are followed.

### The Value of the Sign Load.

Before getting down to technicalities I should like to say a few words about signs from the power station point of view. In America, where electrical advertising is further developed than it is here, signs are regarded as a most desirable load, and many supply companies have departments specially to promote the use of signs. It is calculated that for every £100 spent on sign construction the authority gets an *annual* revenue of £15. In Detroit, for example, the electrical advertising load in 1927 was calculated at 18,000 kW, which meant a revenue for the year of 1,500,000 dollars.

It should be mentioned that, while signs certainly do add to the peak load, they are mostly kept on for a long while afterwards, and therefore tend to add also to the "after-hours" lighting, which I believe is generally considered desirable.

Before leaving this subject, the following comparative table, put forward by Mr. C. W. Sully, Director of the Electric Lamp Manufacturers' Association, at the Geneva Congress may be quoted as being of general interest:—

| Load. | | Load factor per cent. |
|---|---|---|
| Street lighting ... ... ... | up to | 50 |
| Shop lighting ... ... ... | ,, ,, | 50 |
| Hotel and restaurant lighting ... | ,, ,, | 40 |
| Electric signs in central areas ... | ,, ,, | 40 |

Now I think I have said enough to show that signs are desirable for contractors and authorities alike, and I will give a few rules on procedure that I have found helpful in my business as a manufacturer of electric signs, which I think will be of use to anyone handling this class of business. Starting with the assumption that a contractor has received an inquiry for an electric sign, what should he do?

The first thing is to get in touch with a reputable electric-sign manufacturer, who will design and make the sign for him and give him any technical assistance necessary. Sign manufacture in these days is a complicated and specialised business. Contractors who think it is easy and try to make up their own signs with the help of the local tinsmith are only making a rod for

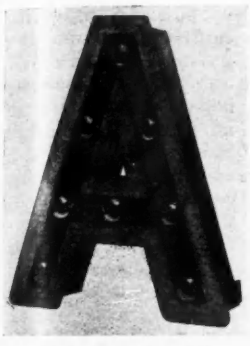
* The Association's second annual conference was held in London on February 19th and 20th.

their own backs. Doubtless I shall be accused of bias on this matter, but I venture to prophesy that anyone who tries the experiment once will eventually agree with me.

The manufacturer will submit to the contractors, on request, a design, specification, and trade price. In order to do so he will require certain information regarding the proposed emplacement of the sign, any particular wording or design to be incorporated, its type, and some idea of what the customer expects to pay.

### Sign Emplacements.

There is not usually very much scope in choosing a site for a sign. A shopkeeper or commercial house has a building upon which it wants a sign, and generally



"Double Flange."

"Wire Gauze."

there is only one place in which it can go. If there is any choice, the most desirable position is that where the sign will best harmonise with the architecture and will be seen by the greatest number of people. The height chosen should depend on the size of the proposed sign. For an ordinary box sign a site between 10 ft. and 11 ft. above ground level is very good. For a higher position a larger sign is required, and really big signs can be put at any height. The emplacement should be accurately measured and its shape noted for the use of the manufacturer. In sending him these dimensions it is helpful if the contractor forwards a drawing also, or at least a rough sketch, of the elevation of the building. Architectural features, particularly promontories, should be noted. While the size of the site available will limit the size of the sign, it does not follow that the sign is required to fill the whole of the available space. Contractors should find out their customers' views on this subject. It must be borne in mind that the modern trend is to make signs as much in conformity with the architecture of the building as possible. Hence the need for this full description of the site.

### Local By-laws.

Most municipalities have by-laws applying to sign erection. These should be ascertained and communicated to the manufacturer. Sometimes signs have been actually erected before it has been discovered that they are illegal. Signs, being usually individual productions, cannot be taken down and used elsewhere, and so steps should be taken in the early stages to see that the proposed sign is within the requirements of the competent authorities.

### Design of Sign.

The actual details of the design are best left to the manufacturer, but the customer will undoubtedly have some idea of what he requires, and the contractor should know enough about sign design to discuss the matter with him in general terms.

First of all sign advertising is essentially exclamatory; it cannot go into details and it is not suitable for long messages in small letters. The design must be bold and the letters large enough to be read from the maximum distance at which the sign is to be viewed. The factor of irradiation is always present in sign designing, and therefore the letters should be well spaced and of plain shape. Lettering of a fancy nature is to be avoided in electric signs.

The actual size of the letters and their spacing are determined by the consideration of height, maximum viewing distance, and the size of the sign. Six-foot letters would be quite useless for a shop window facia, as they would simply be a glare of light to people in the street. On the other hand, 12-in. letters would not be legible at the top of a five-storey building. Where there is a long viewing distance, wider spacing is required than for a close viewing distance owing to the factor of irradiation.

Lettering with strokes of uniform width is generally most suited for lamp-outlined signs, but it is possible to have thick and thin strokes, provided the thick ones are double the width of the thin ones.

### Material and Finish of Sign.

Signs consisting of individual letters may be made of wood or metal. From an electrician's point of view, metal is preferable, as it is stronger, more easily worked, and better adapted to the earthing of the structure. Channel-faced, or, as they are sometimes called, trough letters, are essential for the definition of outlines, and they are, of course, more easy to construct in metal.

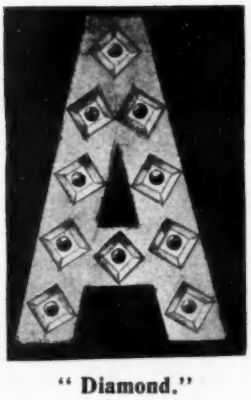
The only advantage of the wood letter is that it is sometimes cheaper, and it is quite suitable for very high sites, the lamps being placed on the face of the letter and not in channels.

Whether of metal or wood, the finish of the sign is important. The faces of the letters, which must reflect the light from the lamps, should be either white or of a pale tint, the colours being spray-painted or of vitreous enamel. Colours darker than the palest daylight blue should be avoided for letter faces. If colour is desired in the sign, this should be obtained by means of using coloured lamps or colour-hoods over the lamps. Where two colours are used there should be as great a contrast as possible between them, but dark blues and mauves should be avoided as they absorb a high proportion of light. For the decorative finish, gilt edges to the letters and a grey or black painting on the structure is recommended.

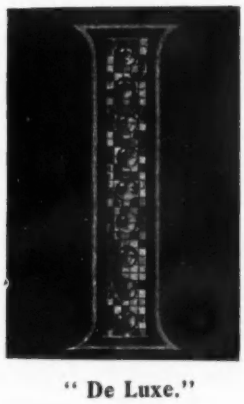
In deciding the finish of the sign it is best to take into account the other signs in the immediate vicinity, if there are any, and to provide as great a contrast as possible within the limits of technical feasibility.

### Types of Sign.

I have not space to catalogue all the kinds of signs on the market; there are some twenty different types of sign



"Diamond."



"De Luxe."

letters in common use, most of them depending on the channel section letter, with various improvements. Then there is the indirectly illuminated sign, in which the light is placed behind glass panels, as in the ordinary projecting box sign.

In choosing the type, the contractor will be guided to a large extent by the preference of his customer or by his own ideas, but it should be borne in mind that for large signs with a long viewing distance, direct lighting, unobstructed in any way, is best, and that means either channel letters or flat-faced letters. The various types of indirectly illuminated signs usually have a better daytime appearance and are best for facias, low signs, and

signs with a short viewing distance, where the loss of a certain amount of luminosity at night is not important, but where daytime appearance counts.

The modern artistic box sign is a very good seller to small stores and shops, and if properly designed can present a most attractive appearance. In this type of sign the lamps should not throw their light directly on to the backs of the glass panels, but the rays should be deflected or reflected in such a way that an even light is thrown on the entire surface of the glass and thus spottiness is avoided.

### Advertising Value of Animation.

Almost any type of sign can be animated with the modern controller apparatus available, and designs worked out in channel-metal work and given animation and colour changing are one of the most potent forms of electrical advertising. They are spectacular, and are, as is not generally supposed, less expensive to operate than continuously burning signs. The application of animation to any sort of sign is a highly technical matter, and it is best in cases in which it is required to give the manufacturer a rough idea of the effect desired and leave it to him to work out suitable schemes.

### Electricity Supply.

For any type of sign it is necessary that the manufacturer should know the conditions of the electricity supply upon which the sign is to operate, because sign equipment, like all other electrical equipment, varies with these conditions. The following information is necessary:—

(1) Voltage, whether d.c. or a.c.

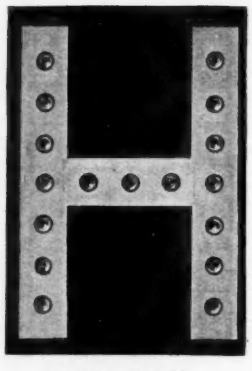
(2) If a.c., the periodicity.

(3) When the supply is 3-wire d.c., or 3- or 4-wire a.c., the requirements of the supply undertaking regarding the balance of load.

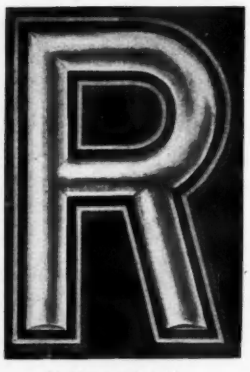
### Capital and Operation Costs.

I mentioned earlier that it was necessary to find out how much the sign user is prepared to pay and also what are his limits on running costs. It is no good sending any manufacturer an inquiry for a sign 5 ft. square or a sign 20 ft. by 6 ft. Any manufacturer can make a sign 5 ft. square to cost £200 or one 20 ft. by 6 ft. for a fraction of that sum. It all depends on what sort of design is used.

It is therefore necessary in designing a sign that the manufacturer should have information as to the approxi-



"Garrick."



"Dayanite."

mate price required, and, in order that he can arrange his illuminations, he wants to know what the customer is prepared to spend on operation. In some districts the operation of a sign is very cheap, and large signs do not cost very much for electricity. In other districts, where rates are high, this factor becomes of paramount importance.

### Specifications.

In ordering electric letter signs (wood or metal outlined with lamps) specifications of the Master Sign Makers' Association should be insisted upon, as these provide a minimum standard of construction for either wood or metal letters. In electric signs, as in everything else, good material and craftsmanship count for a lot, and these specifications lay down certain particulars as to the gauge of metal, the finish, the structure, and the spacing of lamp centres, which make very dull reading, but have proved of immense benefit to sign users and intermediaries.

### Wiring and Accessories.

It is calculated that at least 75 per cent. of the troubles met with in sign operation are due to faulty wiring. Now wiring may be faulty because it has been put in incorrectly, or it may become faulty in service due to inadequate protection. The following rules should be observed in wiring electric signs:—

"Halo-Neon."

The wiring should always be looped into holder connections; the finished leads should be brought to the outside of the letter or box, and connected to the circuit wires by means of porcelain connections or plugs. Joints should never be made inside metal or wood frames. The braiding and taping of ordinary v.i.r. hard-core cable should always have the braiding and cable cut back, and, as in this field there are a multitude of connections proportionate to the amount of wire used, the best results can be obtained by employing a small diameter all-rubber insulated cable or the standard cab-tire cable. Lampholders constructed with bodies of vitreous porcelain are better than brass or other metal holders, and Edison-screw contact affords a surer degree of immunity from troubles due to weather conditions. The bayonet-cap type of lampholder is not suitable for sign use, except perhaps in temporary signs or small box signs. Rubber gaskets should be fitted to all types of lampholders.

### Sign-type Lamps.

Spiralised filament lamps are known in the trade as sign-type lamps, because of their suitability for this service. They have strength and durability under the difficult service conditions of the average exposed sign and should always be used. Sign-type lamps are standardised by arrangement between the sign manufacturers and electric lamp manufacturers. The principal sizes used are 28 mm. and 45 mm., the respective standard wattages being 15 and 20 watts.

The smaller lamps are used for outlining and decorative purposes where in days gone by series lamps were generally used. The larger lamps are used for letter strokes, and, except for very large high signs where a high wattage is necessary, it is seldom that one has to go beyond the 45-mm. 20-watt lamp.

As to colouring, there is some difference of opinion between those who prefer natural coloured glass and sprayed lamps. Personally, I prefer sprayed lamps because natural coloured-glass lamps get very hot and seem to me more liable to failure. Personally, I do not care much for the alternative of using colour-hoods over clear lamps, because, while effective, these hoods are in themselves rather unsightly. Their advantage, of course, is that the colours can be changed without changing the lamps.

I do not, however, wish to be dogmatic on the subject of lamp colours, because I realise that each system has advantages and disadvantages, and within the limits of the best practice there is room for difference of opinion as to which has the balance of advantage. Actu-

ally, I think the position is that a really hundred per cent. efficient system of coloured lamps has yet to be devised.

### Luminous Tubes.

So far my remarks have dealt almost entirely with the filament lamp type of sign. There is now an alternative in the luminous tube sign, which gives a continuous line of light and is daily increasing in popularity.

Most electric sign manufacturers can supply signs on this system, and if they are needed the information required is very much the same as for the filament type. The cost of luminous tube signs is somewhat higher than that of filament lamp signs, but they are often worth the addition in view of their superior appearance.

Luminous tube signs consist of tubes of glass sealed at each end with an electrode and filled with a rare gas which glows on the discharge of high-voltage current from the positive to the negative electrode. Their manufacture is technical in the extreme, but their erection need not frighten anybody with a general knowledge of electrical practice who is prepared to follow a few rules which will be given by the manufacturer.

### Maintenance.

After the sign is erected there is the matter of maintenance to consider. It is a great mistake to sell a sign and then not trouble about it any more; the best procedure is to sell signs under a maintenance contract, that is, the sign costs so much and maintenance for a period of, say, three years costs so much per year; thus the sign is constantly under supervision and gives a greater degree of satisfaction to its user and is a much better advertisement for him. No worse advertisement can be conceived than a neglected dirty sign with lamps gone and letters awry. A sign that is not properly maintained will in a period of years cease to be a good advertisement and become a mere ugly excrescence. The principal items of maintenance consist of inspection, washing, cleaning, and repainting at stated intervals (which will depend upon the atmospheric and general conditions of the town) and re-lamping as required. A general tightening up and inspection about every six months is recommended.

With a well constructed sign, however, provided atmospheric deterioration is not allowed to set in, there will be little to do beyond washing and painting. If the sign is of an animated type, then the flasher apparatus should be inspected as often as its manufacturer prescribes, and the bearings should be adjusted and oiled as necessary. Though a flasher is intricate in its appearance, it has very few working points that are likely to go wrong, and a skilled man is not really needed to look after it.

I think that I have said enough in the foregoing remarks to give some idea of the essential features of the sign business. If it should seem that the business is rather complicated and out of the usual line, let me hasten to explain that in practice difficulties can be smoothed out by co-operation between the manufacturer and the contractor. For example, the various items of information required by the manufacturer are easy to obtain, provided they are particularly in mind, and most of them could be got from a single interview with the customer. In order to facilitate the supply of information of this kind, manufacturers are generally prepared to supply a form which sets out the details required, so that all that is necessary is a little intelligence in supplying correct replies.

Electrical advertising is a growing force in the commercial world, and its value is more and more becoming apparent to advertisers. Already I think it is fairly safe to say that about 30 per cent. of national advertisers use signs of one form or another. I shall be very surprised if in the course of the next five years that 30 per cent. does not become nearly 70 per cent. It is, however, in the case of local advertisers that the greatest growth may be expected. At present only about 10 per cent. of local advertisers use electrical advertising, and of those 10 per cent. only about half are using it to the best possible advantage.

It is in the development of this local business that co-operation between electrical sign manufacturers and other electrical interests can do so much, and the rewards shared between them should be of equal value to all concerned, not excluding the user himself, who will find that by the judicious employment of electrical advertising he will improve his own business.

# Lead Sheaths for Cables.

## The Advantages of Lead Alloys, with Particular Reference to Lead-antimony.

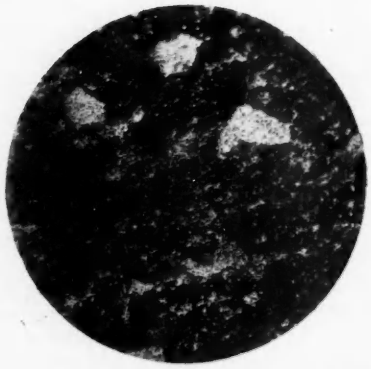
By N. A. ALLEN, Ph.D., M.Sc., A.M.I.E.E.

(*Concluded from page* 276.)

Vibration—the resistance of lead-antimony to vibrational cracking is its most marked advantage when compared with pure lead; whereas pure lead has a fatigue limit of 0.18 ton per sq. in. (measured as the maximum stress which can be applied first as a tensile stress and then as a compressive stress, ten million times without fracture) the fatigue limit of lead-antimony is 0.63 ton per sq. in., that is, nearly four times as great as that of pure lead. Another way of describing the ability of lead-antimony to withstand vibration is to say that under conditions of alternating stress, such as are set up while it is in vibration, lead-antimony will operate satisfactorily for an indefinitely long period, provided the range of stress does not approach $\pm 0.63$ ton per sq. in., a stress range under which pure lead will fail almost immediately, *i.e.*, after a few reversals of stress have taken place. Data on the actual stress on cable sheathing in service under vibrational conditions is difficult to obtain, and no reliable figures are available. Judging, however, from the effects of vibration on pure lead cable sheathing, samples of which have been examined by the author, and the duration of service before failure is known, it is likely that the usual stress ranges are of the order of $\pm 0.3$ ton per sq. in. Pure lead readily cracks at such stresses; on the other hand, lead-antimony *will not fail* at such stresses, and it may be regarded as a completely satisfactory substitute for lead in situations where alternating stress may be set up by vibration.

Apart from the fact that instances of the failure of lead-antimony sheathing in service *due to vibration* are rare, practical confirmation of fatigue tests is afforded in a convincing manner by some work recently carried out. Two lengths of cable, one of which had a

pure-lead sheath of normal thickness, and the other a lead-antimony sheath of the same thickness, were subjected to conditions in which they were exposed to severe vibration. Close observation was maintained, to study the course of the expected deterioration, and the results are illustrated in the accompanying reproduced micro-photographs. Samples of sheathing were removed at intervals, and the interiors examined, since cracking invariably commences on the inside of the sheath, and then develops towards the outside. The effect of stress reversal was early apparent (both to the eye and under the microscope) on the pure lead. Comparing fig. 5 with fig. 3, it will be observed that the regular crystal structure of the pure lead before it was stressed soon became modified. The sharply defined straight edges of the lead crystals soon began to be rounded off, and finally, as seen in fig. 2, there was no further cohesion between the crystals, so that cracks opened up between them. The experiment with lead - antimony was continued four times as long as was necessary to affect the pure lead. Fig. 4 shows that the original crystal structure was much finer. At the termination of the experiment, during which the lead-antimony sheathed cable had been vibrating four times longer than was necessary to damage the pure-lead sheath, the crystal structure, as shown in fig. 1, was almost unchanged; although a certain amount of rounding off of crystals could be discerned, and a slight granulation had occurred, there was no indication that the crystals had commenced, or were on the point of commencing, to separate. Not only is it extremely important that lead-antimony sheathing so successfully resists vibrational cracking, but in addition the absence of intercrystalline disintegration assists in preventing damage by chemical corrosion, which in pure lead is greatly accelerated by incipient separation between adjacent crystals.



**Figs. 1 and 2.—Lead-antimony Sheath after Long Period of Vibration under Service Conditions, and Pure-lead Sheath after Failure due to Vibration under Service Conditions.**

The increase in cost of an alloy of lead is of great importance, because the cost of the lead sheath of any cable is a considerable item in the total cost. Any alloy whatever is bound to cost more per unit weight than pure lead, owing to the cost of alloying. The figures in the accompanying table have been worked out from the prices of the components and do not include the additional cost of alloying.

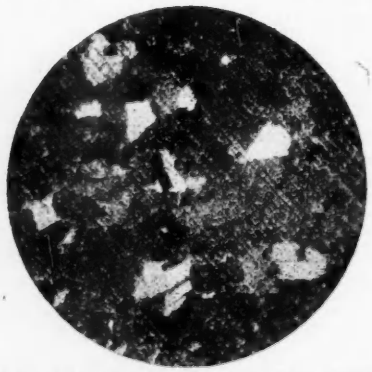
The basic metal prices per ton are: pure lead, £24; antimony, £45; tin, £195; cadmium, £450; and calcium, £2,000 approx.

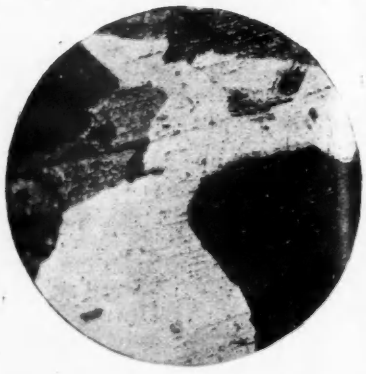
Prices of Lead Alloys, and Increase above Pure Lead.

| Alloy. | Composition. | *Price per ton. | *Increase. | *Percentage increase. |
|---|---|---|---|---|
| | % | £ | £ | % |
| Lead-antimony .. | Pb. 99.2<br>Sb. 0.8 | 24.17 | 0.17 | 0.7 |
| Lead-calcium ... | Pb. 99.96<br>Ca. 0.04 | 24.8 | 0.8 | 3.3 |
| Lead-cadmium-antimony ... ... | Pb. 99.25<br>Cd. 0.25<br>Sb. 0.5 | 25.17 | 1.17 | 4.9 |
| Lead-cadmium-tin ... | Pb. 98.25<br>Cd. 0.25<br>Sn. 1.5 | 27.63 | 3.63 | 15.1 |
| Lead-tin ... ... | Pb. 97.0<br>Sn. 3.0 | 29.13 | 5.13 | 21.4 |

The accompanying table shows that from the point of view of increased cost, lead-antimony is a satisfactory substitute for pure lead, since its properties are available at an increase in *cost of less than 1 per cent. In other words, all the desirable characteristics of an improved cable sheathing material, as set out in the previous section of this article, are present in lead-antimony, at a negligible increment in price. It was pointed out in an I.E.E. discussion† that by changing from lead-tin, which by the above table is seen to cost 20 per cent. more than pure lead, to lead-antimony the American Telephone & Telegraph Company saved more than a million pounds during the nine years from 1913, when the lead-antimony alloy was first introduced, up to 1922.

It has been demonstrated that, if all the relevant factors (among which a very important item is cost) are considered concurrently, the most suitable sheathing for paper-insulated cables, both for general purposes and particularly for severe service conditions, is lead-antimony, which during seventeen years of experience in commercial use has given completely satisfactory results.





**Figs. 3, 4 and 5.—Pure-lead and Lead-antimony Sheaths before Vibration, and Pure-lead Sheath after Vibration in Service Conditions, respectively.**

## Proposed Transmission at 400,000 Volts.

In a recent issue of the *Revue Générale d'Electricité*, M. G. Viel sets out at length a scheme for transmission at 400,000 V. The idea is that at this voltage it would be possible to utilise to a greater extent than at present the hydraulic power resources of France, and to transmit energy throughout Europe. The author deals with the difficulties to be surmounted, the corona effect, insulators, the working conditions, the necessary protection, &c.

* Exclusive of alloying cost.

† Discussion of paper by P. Dunsheath—"Lead Cable Sheaths"—*I.E.E. Journal*, Vol. 66, 1928, p. 638.

# The Domestic Consumer.

## The Value to the Supply Undertaking of Studying the Point of View of the User of Electricity.

By R. H. RAWLL, A.M.I.E.E., A.M.I.Mech.E.

NUMEROUS articles appear from time to time in the electrical Press describing the developments which are taking place in various districts throughout the country with regard to domestic electrification, and many very interesting descriptions are also given of the different appliances which are available for use in the home. In addition to these the propaganda work of the British Electrical Development Association with its local circles representing the manufacturing, supply, and contracting interests, deserves full recognition and support. It must, however, be admitted that the vast majority of these articles and propaganda activities are the work of electrical "missionaries"; very rarely does the viewpoint of the "converted," or average domestic consumer, appear in the guise of the printed word or other means of expression.

It is true, of course, that one of the results of the activities of the Electrical Association for Women has been to bring to light many little snags with regard to domestic appliances. Although such appliances may be from the designer's point of view very efficient, yet from that of the person who actually uses them they are capable of considerable improvement. There are, however, very many other matters which vitally affect the interests of domestic consumers which are very rarely expressed by them as a body in such a way as to reach the attention of the electrical industry as a whole, or at least, that part of it which is concerned with domestic electrification.

This does not mean that the average consumer is inarticulate in his views. A glance at the correspondence files of any electricity supply undertaking would soon refute such a conclusion. The difficulty seems to lie in that individual expressions of opinion of consumers are usually treated individually and action is taken accordingly. Many supply undertakings do not alter their routine procedure with regard to one particular aspect of their service to the domestic consumer until the number of complaints forces them so to act. Surely, it would be in the best interests of all concerned actually to encourage suggestions, &c., from consumers, for by so doing the full benefits of co-operation could be achieved; the consumer would then be able to take a lively interest in the activities of his particular supply undertaking and recognise that it was out to help him to its fullest extent, and not look upon it, as so many consumers do, as a soulless machine which merely sends out quarterly demand notes for electricity consumed.

The question, therefore, arises, that, if it be desirable that the various viewpoints and opinions of consumers—at present inarticulate—should be collectively crystallised into audible expressions of opinion, how is this to be effected? This obviously depends on local circumstances, and it would be interesting to hear the views and suggestions of other engineers on this point. There is an old saying in the electricity supply industry that "the consumer is always right." While this may not always be literally true, experience has taught the author that in dealing with a complaint from a consumer it is wise to adopt this attitude of mind until the facts of the case, after thorough investigation, prove the contrary; or in other words, "try to see the other fellow's point of view." It may, therefore, not be without interest to mention here briefly one or two matters about which the average consumer holds decided views.

First of all, consider the attitude of many supply undertakings towards the prospective consumer. In numerous instances it is a case of "you must make application and then wait your turn." This attitude of a supply undertaking is more unfortunate in that it makes a bad impression on the consumer at the start. In any other industry, on an inquiry being received for a particular commodity, terms are stated right away and the business followed up, the prospective customer being "nursed" until he gives his order, which when received is quickly executed. In other words, more live interest should be taken in potential consumers when they inquire for information regarding a supply of electricity, and the terms on which supply can be given should be sent to them *as quickly as possible*. Most undertakings require a definite guaranteed return from a revenue point of view before an extension of a distributing main is made. This often takes the form of refusing to extend the main unless a certain number of householders agrees *in writing* to take a supply. Now, human nature is such that many people will not give such an undertaking; they think there is a catch in it somewhere. Providing that the property along the proposed run of the main is similar to that in other parts of the district where many consumers are connected, a little imagination on the part of the supply undertaking would show that, if the main were put down forthwith, the very fact that the main now ran past their doors would cause many of the householders to make application for supply immediately. Besides, the rivalry spirit is still very strong in our suburbs. If Mrs. Jones has a supply of electricity, it is highly probable that in a very short space of time Mrs. Brown and Mrs. Smith will have induced their respective husbands to do likewise. But the point is, one must get Mrs. Jones actually using the supply first and not merely get her to agree in writing to take a supply should it be available.

Then take the question of the location and method of installing service equipment. Most undertakings possess standard boards for mounting meters, cut-outs, &c., the sizes of which were of no account when every house had a cellar; nowadays, with the advent of the average modern house, this equipment constitutes a most aggressive eyesore if fixed in vestibules, front rooms, &c. It is obvious that there is distinct need for improvement in this connection. Again, with regard to apparatus which is hired from a supply undertaking, all complaints and suggestions of consumers should be thoroughly investigated, tabulated, and remedied by removing the cause of the complaint or adopting the suggestion if at all practicable.

As has been pointed out above, the design of a piece of domestic apparatus may be the last word from an efficiency point of view, but it may also be perfectly stupid from the user's point of view. Cookers are the chief offenders in this respect, and here may be mentioned a personal experience of the author. Quite recently the cooker on hire from the supply authority in the author's private house was in service cooking the Sunday dinner when a loud report came from this appliance. It was ascertained that the *neutral* fuse of 20-s.w.g. copper in the cooker, main switch, external to the cooker, had "blown." The cooker's internal fusing arrangements were of the usual type, that is, a separate fuse for each hot plate, grill, and oven element on *the live pole only*. Examination showed that none of these fuses had blown, but a test lamp indicated that there was an "earth"

on the neutral wiring of the cooker. Since, the neutral ends of all the heating elements were connected to a common wire, this meant disconnecting in turn each hot plate, the grill, and the oven elements to ascertain where the fault lay. This was eventually traced to the oven elements which were temporarily disconnected to await repairs. The main point to be observed is that, by installing single-pole fuses, the makers have saved a few shillings, but with a neutral fault as above the *whole* of the cooker is put out of commission until the faulty element can be disconnected; this would not be the case if double-pole fuses had been installed. Of course, this neutral fault may have been on for some considerable time and it was only when an earth came on the outer of the system (d.c. 3-wire) somewhere in the locality that the fault was disconnected by the blowing of the neutral fuse in the cooker main switch, which it did at the expense of putting the whole of the cooker out of action. Here, obviously, is a case of "penny wise and pound foolish."

Perhaps it may be said that the specimen points of view put forward here are not representative of those of the average consumer and are necessarily influenced from the author's professional point of view. Be that as it may, the fact remains that there is a distinct tendency in the commercial world to-day, by means of intensive propaganda, to tell the customer what he ought to have, which may be very different to what he actually *wants*. The measure of success which is achieved by the electrical industry in harmonising these two points of view will be a true indication of its ability to give service to consumers.

# Electricity on Ships.

## Some observations and recommendations based on practical operating experience of the electrical equipment of modern passenger and cargo vessels.

(*Extracts from a paper read before the* INSTITUTE OF MARINE ENGINEERS.)

THE extent and variety of the services that are being successfully performed electrically on board passenger and cargo ships are made evident by the tabulated and descriptive data in Mr. J. E. Allan's paper. Stimulated by the demand for increased efficiency, convenience, and passenger comfort, the enormous increase in the use of electrical methods has been partly due to the greater use of oil engines, but it is agreed that more confidence in the reliability of electrical apparatus accounts for the balance.

When lighting constitutes the main load 2-wire 110-volt d.c. distribution is mostly used, but when power services form most of the load the 3-wire 110/220-volt system has been used (the lower voltage for lighting). Lamp improvements have resulted in the 2-wire 220-volt system being adopted generally with success, and in some ships a 220/440-volt 3-wire system has been fitted. The general tendency to increase the voltage is an endeavour to effect a saving in the weight of copper used, but against this saving must be placed the additional cost in providing more adequate insulation and protection generally; again, the maintenance cost has proved to be higher than when lower voltages are used. The ring main system, as used on ships of H.M. Navy, has also been employed with success on a few merchant vessels, but has not become popular because of the difficulties of sub-distribution laterally deck by deck in order to provide convenient control of the different classes of passenger accommodation. A central switchboard system has inherent disadvantages when employed on large vessels owing to the concentration of wires at a central position which, in case of fire or other damage in the vicinity of the switchboard, might result in serious interruption of the services. With a view to overcoming such objections, the author has recently developed a modified scheme of Holt distribution on the ring main principle which differs to some extent from that used in ships of H.M. Navy; it is considered particularly suitable for large motor-driven cargo vessels, but has not been used in practice as yet.

Totally-enclosed motors have proved to be the best type, but their initial cost is greater than that of other varieties. They are recommended up to 40 h.p., but are impracticable in larger sizes; when large machines are required such motors incorporating special cooling devices have distinct advantages over the protected type.

The temperature rise of machines used in confined spaces must have special consideration; while certain regulations are available for guidance, they should not be taken too literally. Normal temperatures in the engine room of ships trading in the tropics average about 110 deg. F. Temperatures of 140 deg. F. are frequently recorded in 'tween decks, flats, and pockets where auxiliary machinery is placed. These conditions are no doubt unknown to those manufacturers who recommend 90 deg. F. when running continuously at full load.

Many failures of motors may be traced to excessive undercutting of micanite insulation; a fixed rule cannot be made applicable for all machines. It is advisable to slightly undercut the mica of high-peripheral-speed commutators; while for low-speed and intermittent-running commutators, particularly when used in oil-engine rooms, undercutting is not recommended. Open-type machines which are used intermittently collect oily vapour while stationary and a conducting path is thus produced between the copper segments, ultimately resulting in a defective commutator.

The convenience of control which automatic gear provides is creating a tendency for this form of apparatus to be used, where possible, for all sizes of motors. The laminated contact with the separate sparking tips has distinct advantages over the butt type, for the claim that heat is readily dissipated cannot be substantiated in practice. In 1920, for a ship having a twin screw set of Diesel engines with a total s.h.p. of 4,800, the total length of the engine room was 63 ft. To-day in a similar hull the length of the engine room has been reduced to 54 ft., while the total s.h.p. has been increased to 8,600. This reduction in space has caused a difficulty in finding suitable positions for starting arrangements; as starters, &c., frequently require as much space as the motors, anything which can be done to reduce the size or number of this apparatus must have full consideration. A common starting arrangement for a number of motors within a limited range of horse-power is an advancement made to meet the foregoing. The system provides automatic means of starting with push-button control at each motor. The common starter, with heavily rated resistances fitted at the main switchboard, or other suitable position, is used to start all motors in the particular group concerned. The usual protective devices are employed, and each motor may be isolated when required. Therefore, a saving is effected in space, resistances, cases, and spare gear required. A number of recently-built ships have been fitted with this form of control for the motors driving auxiliaries in the engine rooms, and the cost was no greater than if independent starters had been fitted. When it is considered that most of the switchgear equipment used is attached to the main or auxiliary switchboards and easily visible and accessible, it will be realised that maintenance is reduced to the minimum.

Electrical deck machinery, which comprises windlasses, winches, capstans, &c., has to a great extent taken the place of steam machinery on large passenger and cargo liners, and in certain cases better control is obtained than with steam.

That the use of electrical cooking apparatus is now finding more favour on board ship may be attributed to the advancement in the design of this class of plant. The principal advantages claimed are simplicity of control, even cooking temperatures, and cleanliness. Another important feature is that the current taken by the galley equipment is of a constant nature, and has the effect of stabilising and also increasing the load factor of the dynamos. It is agreed that the first cost of the electrical system is higher, but the operating and maintenance costs of the electrical gear compare very favourably with those of the coal-fired system.

To obtain satisfactory results with the electric heating of cabins and other confined spaces, experience has shown that the following loadings should be provided: one watt per cu. ft. in temperate climates, and two watts per cu. ft. in arctic climates. Water boiling is now being done successfully, and failures have been reduced to the minimum by the introduction of automatic control. On modern passenger vessels a combination of steam and electric heating, or the distribution of hot air through ventilating trunks, have been found to be the most satisfactory systems. Steam radiators are provided in the alleyways and passages to raise the general temperature of the space, and electric radiators are fitted in each stateroom to enable the room temperature to be adjusted to suit the requirements of the occupant. With the trunking system cool fresh

air may also be obtained when required. The ventilation and heat distribution, however, do not provide the desired flexibility and in certain modern vessels the introduction of electric radiators has been found necessary. On Diesel-engined vessels, where steam is not available for heating, electricity is an extremely satisfactory and economical alternative.

In modern passenger vessels mechanical ventilation has become universal. Notwithstanding the air changes provided by the trunking system, the popularity of the individual fan per cabin still exists, the most popular design being the oscillating type which gives an intermittent fanning effect.

The importance of adequate and proper lighting is now generally recognised, not only for the convenience of passengers, but also for decorative purposes in producing artificial sunlight and other effects.

A new development has recently taken place in the manufacture of electric cable and results up to the present indicate that for many situations more satisfactory service will be obtained from its use than from any other of the generally used cables. The dielectric of this conductor consists of tapes coated with plastic and non-hygroscopic cellulose, which material has the quality of resisting oil, oily vapour, extremes of heat and cold, and is fire proof. The tinning of the conductor, which is necessary to protect the copper against the sulphur present in rubber coatings, is unnecessary, which leads to a further economy in production. Cellulose is chemically inert and cannot change or deteriorate with age, and the use of such material must greatly increase the reliability and life in service of conductors so insulated. The usual forms of mechanical protection are used.

# High-voltage Measurement.

## Methods of Ascertaining Peak Values, a Simple Neon-tube Crest Meter, and Sphere-gab Calibration.

*(Extracts from papers read before the* METER AND INSTRUMENT SECTION *of the* INSTITUTION OF ELECTRICAL ENGINEERS.)

AT the February monthly meeting of the above-named section of the Institution three papers were submitted on the measurement of extra-high voltages. They are summarised below, the first-mentioned one having already been published in the I.E.E. *Journal*, No. 405, Vol. 68, September, 1930.

### Peak Values.

The paper by Messrs. R. Davies, M.Sc., G. W. Bowdler, M.Sc., and W. G. Standring, M.A., discusses two methods of ascertaining peak values which have been investigated at the National Physical Laboratory. In the one method a condenser divider is used, and the voltage on the low-voltage arm of the divider is rectified. In the other the current through a condenser connected across the voltage to be measured is rectified, the mean current so obtained being a measure of the peak voltage across the condenser. The accuracies of the methods are considered theoretically for different wave-forms, results arrived at by both are compared, and agreement to about two parts in 1,000 is obtained when suitable precautions are taken for the measurement of peak values up to $10^6$ volts.

### Neon-tube Meter.

Mr. L. E. Ryall, Ph.D. (Eng.), A.M.I.E.E., discusses the general principles governing the design of a simple neon-tube high a.c. crest voltmeter and the precautions necessary to secure reliable operation; details of a 150-kV (maximum) instrument are included.* A capacitance potential divider $C_1$ $C_2$ is connected across the supply to be measured; the neon lamp is connected across $C_1$, whose capacity is reduced until the lamp glows and the total applied crest voltage $V_{max.}$ is then computed from the equation $V_{max.} = V_{a.c.s.}(1+C_2/C_1)$ where $V_{a.c.s.}$ is the a.c. striking voltage of the lamp, upon the constancy of which the accuracy of the method depends very largely. The performance of a neon lamp near the a.c. and d.c. striking voltages has been investigated by the author, who outlines means of selecting suitable lamps for such use. The extinguishing voltage of the lamp is recommended as a voltage sub-standard if the supply frequency is known approximately; the voltmeter readings are then correct within an error of less than ± 1 per cent. If the frequency is unknown, or the wave-form very peaked, the striking voltage of the lamp should be used as the sub-standard, and the reading error will then be less than ±2 per cent. The experimental work has been carried out at the East London College (Prof. J. T. MacGregor-Morris), and some of the tests were performed with the e.h.p. equipment of W. T. Henley's Telegraph Works Co., Ltd.

### Sphere-gap Calibration.

The paper by Messrs. S. Whitehead, M.A., A.M.I.E.E., and A. P. Castellain, B.Sc., recalls that in 1926 proposals were placed before the International Electrotechnical Commission for the provisional acceptance of the American I.E.E. calibrations for a sphere-gap when used as a high-voltage voltmeter. The E.R.A. report L/T16 on "Sphere-gap Voltage-Measurement Standardisation," which was presented to the I.E.C. by the British delegation, examined the experimental work that had been done upon spark-over between spheres, and it was concluded therein that further experiments were required in order to obtain more accurate calibrations. At the same time, figures were given for a new size of sphere (20 mm. diameter) obtained from experiments made by the British Thomson-Houston Co., Ltd. At the I.E.C. meeting in 1927 existing calibrations were provisionally accepted, but the necessity for further work was also agreed. The present investigation was conducted at the East London College as a contribution to the study referred to above, the results forming technical report L/T40 of the British Electrical and Allied Industries Research Association.

The various methods available for measuring high voltage are described and their accuracies and convenience discussed. The existing standard recommendations with respect to the proximity of neighbouring objects were confirmed, but some of the precautions appear to be too stringent, whereas some factors, particularly the size of earth plate, should be taken into account. A strong source of ultra-violet light decreases the spark-over voltage, radiations of wave-length at least less than 3,200 A.U. being necessary. The decrease varies with the intensity of the radiation and does not reach a limit under normal circumstances. Since a weak source of ionisation appears to be adequate for ensuring regularity of results, illumination with ultra-violet light is not recommended; but it is desirable that some degree of initial ionisation should be ensured, such as that due to weak corona, although this ionisation appears usually to be present without special procedure. The effect of the surface conditions was found to be very complicated; it is concluded, as in a previous investigation, that a clean polished surface, but not a mirror polish, is desirable. The effects of humidity and different types of contaminated atmospheres were investigated. The effect of humidity alone was a small decrease in spark-over voltage. Smoke of different types produced different effects and varied also according to the humidity. A large decrease of spark-over voltage was produced only by a very thick cloud of smoke. The spark-over voltage was found to be irregular in an atmosphere the humidity of which was changing. The behaviours of spheres of brass, phosphor bronze, and mild steel were compared. In the author's experiments phosphor bronze was found to be most satisfactory for a number of reasons, but definite consistent differences between the metals were not established.

Calibrations are put forward for 20-mm. and 62.5-mm. diameter spheres up to 80 kV (r.m.s.). The calibrations for 20-mm. diameter spheres agree substantially with those previously put forward as provisional standards by the E.R.A. based on experiments made by the British Thomson-Houston Co., Ltd. They also do not show a very great variation from the recent figures adopted by the American Institute of Electrical Engineers. The calibrations for 62.5-mm. diameter spheres agree with the revised American I.E.E. figures up to about 50 kV (r.m.s.), but are low compared with the latter for voltages above this figure.

The accuracy of the calibrations is discussed, and it is concluded that they are limited by the inherent variations of spark-over voltage. It is considered that a probable error up to about 0.5 per cent. in a mean of 4 or 5 readings must be admitted, for which it has not been found possible satisfactorily to account. Thus the sphere-gap is not considered to be a measuring instrument of the highest grade, although it is more reliable than many high-voltage voltmeters at present commonly used in commercial practice.

*The subject-matter of this paper forms part of a thesis approved by the University of London for the Degree of Ph.D. (Eng.).

# Street Lighting.

## Growing Tendencies which should be Avoided.

**By C. C. PATERSON, President.**

(*Extracts from an address at the* Sheffield Sub-Centre *of the* Institution of Electrical Engineers.)

THERE has been growing during the past two years a very strong movement for the extension of good street lighting and for the improvement of existing installations. Manufacturers, as is right, are prepared to supply what the authorities seem to want, but the criterion for judging what is desirable is not completely defined, even in the B.E.S.A. street-lighting specification, while the most important desideratum is often not understood. The two ruling factors are: first, cost and, secondly, whether residents in the road will regard a proposed installation as cheerful and nice looking, to which may be added the desire to get a street into what is regarded as the highest possible "class" of the B.E.S.A. specification (provided price is not increased by doing so) in the mistaken belief that those classes are intended to represent an order of merit.

Now it is becoming increasingly clear to me that the combination of these three factors is leading to a very undesirable tendency in some of our street lighting. People are forgetting that good visibility of individuals and objects on the road should, in these days, be the first criterion. Fast-moving traffic, even in side roads, has come for good and the safety of road users should come before any question of bright and cheerful appearance, or of a street's position in the B.E.S.A. specification. The scientific design of fittings has enabled the illumination engineer to direct light where he pleases, and he is encouraged to concentrate it in the direction of the eye of anyone looking along the road, through the preference of those who mistakenly think that the brilliancy of the light they see is a measure of its effectiveness, a misapprehension which is too often current. Alternatively, there are those who wish to obtain the test-point illumination of the B.E.S.A. specification with as few posts as possible at the longest spacing; in itself a laudable object, but to do it so often has the same unfortunate effect of requiring an intense light concentrated nearly horizontally, where it deadens the sensitiveness of the eye of the driver for noticing objects which he is approaching.

We thus have glaring installations which, I am confident, will give cause for serious complaint before long. I predict that the motoring public will soon realise the unnecessary disability under which it is put; it is being asked to safeguard the life and safety of other road users under conditions of lighting which are not chosen to give the best visibility.

Directive street-lighting installations are not bad, for the factors affecting this kind of glare are fairly well understood. In the present state of the art the best installation is a compromise between visibility and price. I believe we shall come to installations in which the direct light to the eye is, in a large measure, moderated at those road positions where such light interferes seriouly with visibility. The 1927 issue of the B.E.S.A. street-lighting specification includes a glare clause which, in effect, places a limit upon the polar distribution of the light source, having regard to the mounting height, the general brightness of the street, and the degree of ocular disturbance produced by one fitting. Whilst later work has shown that the more distant sources have a pronounced effect which cannot readily be estimated by methods suitable for a specification, the general principle holds good, namely, that luminous intensities should be restricted more particularly in the neighbourhood of from 20 deg. to 30 deg. from the horizontal, to reduce glare from the first lamp; and should fall to a low value near the horizontal, to minimise glare from the distant lamps.

Provided always that the fittings will be accurately erected, focused, and maintained, fittings confirming to candle-power restrictions of the character mentioned will be effective in reducing glare; but, if concentrated beams are produced, a small error in focusing may result in greatly increased illumination of the observer's eyes at low angles, in consequence causing serious glare. It will probably be found that a bright light which has for its background dark trees, or a black sky, is much more dazzling than the same light when the contrast is toned down by having light buildings, or lighted shops, behind it.

In conclusion, I would like to point out that in factory lighting we have discarded the habit of having bright light shining in the operator's eyes. We have accepted the slogan "illuminate the work and not the eye." In home lighting we have realised the discomfort of bare lamps in the field of vision. In street lighting, in which case seeing is much more critical (it is not a question of comfort and efficiency, but of dangerous accidents) it is imperative that those who have any share in deciding upon installations shall adopt a similar guiding principle. Illuminate the object to be seen rather than the eye.

# Parliamentary Notes.

**(By Our Special Parliamentary Reporter.)**

### G.P.O. Lines.

On February 10th Mr. Vincent, the Assistant Postmaster-General, informed Mr. Day that approximately 1,300,000 miles of overhead telegraph and telephone wire was at present in use, and 27,500 miles of overhead wire was recovered during the year ended September 30th last. The total mileage of underground wires was 7,600,000.

### Electrical Traffic Indicators.

On February 11th Mr. Harris asked the Minister of Transport if he was aware that in those Continental countries where signalling was done by means of mechanical direction indicators, one type, namely, the electrically-illuminated and either mechanically or electrically-operated semaphore arm type, was in vogue; and would he embody in the highway code the recognition and recommendation of this type to avoid the use of a multiplicity of direction indicators.

Mr. Morrison said he was aware that the type of direction indicator referred to in the first part of the question was extensively used. As regarded the second part of the question, he did not think that the adoption of a particular type of mechanical or electrical signal could appropriately be recommended in the highway code.

### L.N.E.R. Electrification.

On February 11th Mr. Muggeridge asked the Minister of Transport if he would state what was the present position of the proposed scheme to electrify the London and North-Eastern Railway line from Liverpool Street to Romford and beyond; whether the Government had agreed to give financial assistance, under the Development (Loans, Guarantees, and Grants) Act, for any such scheme; and whether, in view of the rapid increase of population in that part of Essex, he would take all possible steps to facilitate the electrification of this line.

Mr. Morrison said that the London and North-Eastern Railway Company was at present widening its line in the neighbourhood of Romford, and was investigating the possibility of constructing a tube railway to Ilford. It had not, however, made any application under the Development Act for assistance in connection with the electrification of the existing lines in this district.

### Overhead Lines and Aircraft.

On February 11th Captain Balfour asked the Under Secretary of State for Air whether his attention had been drawn to a recent accident caused by a civil light aeroplane colliding with overhead h.p. wires at Dagenham; what steps had been taken to minimise the danger to aircraft from this cause by means of marking or lighting the pylons of such systems to render them visible from the air; and if, as the result of this accident, any further developments in this direction could be speeded up.

Mr. Montague said that the answer to the first part of the question was in the affirmative. As regarded the remainder of the question the feasibility of measures for the purpose of marking or lighting overhead lines was under discussion with the Electricity Commissioners.

### Economy and Unemployment.

On February 11th Sir L. Worthington Evans moved a vote of censure upon the Government "for its policy of continuous additions to the public expenditure at a time when the avoidance of new charges and strict economy in the existing services are necessary to restore confidence and promote employment." The Chancellor of the Exchequer (Mr. Snowden), replying for the Government, said that the appointment of another "Geddes" Committee had been proposed, but while he would consider the proposal he doubted whether it would lead to definite results. He admitted the gravity of the existing situation, and said that if the present standard of living was to be maintained schemes for improving it must await the return of prosperity. The Chancellor foreshadowed a heavy deficit and the necessity for "drastic and disagreeable measures" if Budget equilibrium was to be maintained and industrial progress made. He was anxious to avoid putting any further burden on industry. In conclusion, he maintained that the country's credit stood high and we had suffered less than some other industrial countries. Our position was fundamentally sound—sounder than that of any other country in the world. All parties must unite to formulate effective measures to overcome our temporary difficulties and to restore our former prosperity.

Sir Donald Maclean, on behalf of the Liberal Party, moved an amendment to the vote of censure. This called upon the Government to formulate and present to Parliament an extensive policy for the provision of employment. A number

of directions in which work could be found were mentioned, among them being electrical and telephone development.

In the course of the debate MR. HARTSHORN, the Lord Privy Seal, claimed that the Government, by development and relief schemes, had placed 200,000 men in employment. That was a very modest estimate. Under Part I of the Development Act they had the Lewis Committee schemes in operation totalling £32,000,000—schemes in connection with railways, gas works, electricity, waterworks, docks and harbours. Those would be completed, except for two small schemes, in three years, and would provide for an annual average number of 43,000 men. There was also acceleration work by the Post Office. There was about £10,500,000 of normal programme, and £1,500,000 worth of acceleration, but they only claimed £1,500,000 for employment purposes. The lowest number that could be employed on that was 1,500. In all the figures that he had given he took no credit for some special electricity work. He had as yet been unable to get from the contractors figures showing the total number of men employed on this work, but he had it from the Central Electricity Board that a conservative estimate would be 8,000. He had not, however, included that in his total of 200,000, because he had not sufficiently definite information.

The amendment was carried and passed as a substantive motion without a division.

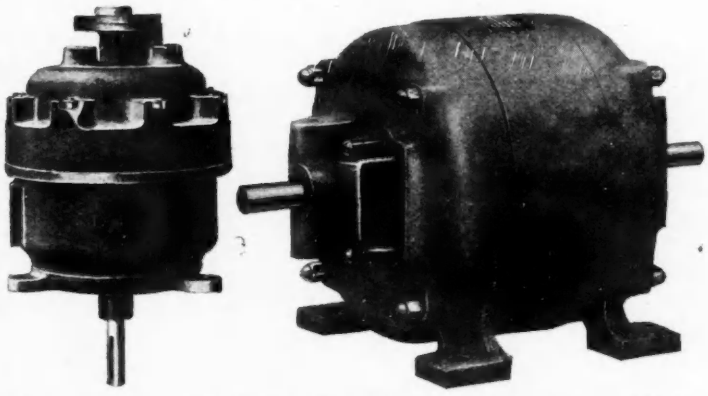
### The Buenos Aires Exhibition.

On February 16th, in reply to a question by Mr. Hacking, MR. W. R. SMITH, Parliamentary Secretary to the Board of Trade, said that according to the latest available information 947 United Kingdom firms had booked space at the British Empire Trade Exhibition at Buenos Aires. It was probable, however, that there had since been additions to that number. The exhibits comprised examples of practically all classes of British goods for which there was a market in South America.

# Fractional H.P. Motors.

### Notes relating to two interesting developments.

WITHIN the last few years a number of British manufacturers have made a certain amount of progress towards the production of a British repulsion-induction fractional h.p. motor, in certain limited sizes for one or two standard speeds. These machines individually bear quite favourable comparison with their American predecessors, but compared with the motors offered by the American manufacturers, the ranges of sizes and speeds are meagre, and no doubt explain why £100,000 value of fractional h.p. motors is shipped into this country annually from the U.S.A. Bearing these factors in mind Messrs. M. W. Woods, Ltd., have during the last twelve months concentrated on the production of a motor which would offer a British alternative to the American productions, with the added advantage of facilitating alterations in the design to enable the motor to be built in as an integral part of other machines when required.



**Figs. 1 and 2.—" Woods " Petrol-pump and High-torque Motors.**

The motor, fig. 2, is of the wound-rotor type, and is available in sizes of ¼-, ⅓-, ½-, ¾- and 1-h.p. at 2,800, 1,400, 930 and 700 r.p.m. When switched direct on to the mains it will develop a minimum starting torque of 200 per cent., which in certain cases can be increased to as much as 250 per cent. if particularly desired. A prominent feature in connection with these motors is the silent running, which should enable their field of application to be unlimited, particularly as regards domestic uses. The motor is of very simple design, the only wearing parts being the bearings, the two carbon brushes which feed the current on to the wound rotor, and the surface of the slip rings.

The action taken by a number of municipal authorities in prohibiting the use of motor-driven petrol pumps fitted with electric motors which have not been submitted to the University of Sheffield Mining Department's appropriate test has been responsible for a considerable amount of activity amongst motor manufacturers in this country.

In approaching the design of such a motor Messrs. Woods kept prominently before them the fact that these motors would be required for use in all parts of the country and therefore, particularly as regards single-phase machines, it would be necessary for the one design of the motor to cover all frequencies from 25-100 cycles and still maintain a common speed of 1,400 r.p.m. wherever the frequency permitted. The ½-h.p. continuously-rated single-phase motor (fig. 1) which was granted the certificate of test as to flame-proof quality by the University of Sheffield recently is claimed to be the first motor of its type, *i.e.*, continuously rated and developing 200 per cent. starting torque, to be manufactured in this country and to obtain a certificate of test, and the second motor to be granted a certificate in connection with the particular application of petrol pump drives. In the design of the motor the amount of space available is in many cases considerably restricted, both as regards height and diameter, while, owing to the fact that a number of the pumps are of American manufacture and have been designed for use with American motors, fixing centres, spigots and other factors have to be studied in addition to the limits laid down by Sheffield.

It is interesting to note the divergency of opinion which exists amongst the various municipal authorities; while the L.C.C. does not insist on a motor holding a Sheffield certificate being fitted, Manchester, Glasgow and numerous other municipalities do. Owing to the fact that there had not been such a motor hitherto available, the stipulation of a " Sheffield " might have prohibited the use of motor-driven pumps, but the recent introductions should overcome this difficulty.

# The I.E.E. Dinner.

### The Minister of Transport's Justification.

THE annual dinner of the Institution of Electrical Engineers was held on February 12th at the Connaught Rooms, London, W.C. The number of members present was 701, appreciably the highest figure yet recorded.

After the royal toasts had been honoured, the President read the following greeting:—" At the beginning of the year in which the electricians of the world will celebrate in London the glorious centenary of Faraday's discoveries, the Société Française des Electriciens sends its most cordial greetings to the Institution of Electrical Engineers."

**The Rt. Hon. Herbert Morrison, M.P.** (Minister of Transport), in proposing the toast of " The Institution of Electrical Engineers," referred to the occasion as the diamond jubilee of the Institution, which, although the youngest of the leading engineering bodies, had the largest membership. The committees set up by the Institution had been of great help to the Electricity Commissioners, particularly in regard to the revision of the overhead-line regulations, and the I.E.E. wiring rules were recognised as the standard for good work in this country. He urged all branches of the industry to give increasing support to the British Electrical and Allied Research Association. He emphasised the importance of the principle stated in Mr. C. C. Paterson's presidential address that investigations resulting in improvement from the consumers' point of view were necessarily advantageous to the supply undertaking also.

Referring to the criticism's of his activities made by the gas companies, the Minister said that his offence had been the encouragement of the industry which he represented in Parliament to go forward in confident expectation of a bright future. He had no wish to check or supplant the great and progressive gas industry, whose enterprise he had often quoted as a model to the electrical industry; he believed there was room for both. The next charge brought against him was that he had stated that he lived in an all-electric house; he only practised that electrical efficiency he urged upon the industry. He hoped that the railway companies would not regard his travelling by motor car as a deadly blow at rail transport!

A third charge was that either the Minister of Health or the Minister of Transport was responsible for the provision by certain municipalities of electricity for heating and lighting on their housing estates. This was definitely not the case.

The Government's position and his own was that it was necessary, especially in these times of depression, to urge the electrical industry forward for the advantage of the country.

**Mr. C. C. Paterson, O.B.E.** (president), responded. He said that the great and outstanding service the Institution had rendered to the industry was that it had given vision to its

members. The portraits on the walls of the Institution lecture theatre were of men who were not primarily engineers in the accepted sense of the word, but who had put science and inquiry first. A century ago Faraday's greatest interest was in discovery. Science should be in an intimate and real partnership with industry. The whole of physical science was comprised within the sphere of electricity and there should be no artificial boundaries.

**Col. Sir Thomas F. Purves, O.B.E.** (past-president), proposed the health of "Our Guests." After mentioning the national gain by the exports of electrical manufacturers, and prophesying a final verdict in favour of the Minister of Transport, he referred in happy terms to the various associations represented among the guests. Those who have heard Sir Thomas speak will understand what is meant when we refer to his speech as inimitable.

**Sir Roger Gregory, LL.D.** (president, Law Society), and **Mr. H. de le Paulle** (president, Société Belges des Electriciens) briefly responded.

On the conclusion of the speeches, the company stood in silence for a few moments in respect for the memory of the late Sir Charles Parsons.

The dinner was followed by a re-union. These re-unions are always most delightful and this one was not one whit less so than its predecessors.

# Legal.

## Imprisonment for Wireless Frauds.

BEFORE the Common Serjeant (Sir H. F. Dickens, K.C.), at the Central Criminal Court, on February 11th, Edgar W. Smith, 32, described as a merchant, pleaded "Guilty" to forging bankers' cheques with intent to defraud, uttering forged documents, and receiving or obtaining wireless sets, with intent to defraud, by means of forged instruments. The Common Serjeant took into consideration also 11 other cases.

MR. ROBERT STEVENS, prosecuting, said that the prisoner was employed by an Italian subject, Mr. Chiodini. The latter said that three of his cheques which had been given by the prisoner were returned to him. He had never authorised the prisoner to use the cheque book, nor did he ever authorise his name to be used in any way whatever.

MR. MARSHALL, a wireless dealer, said that in December last he received a visit from the prisoner. The latter produced a card with a name on it purporting to be that of a company which he represented, and asked to be supplied with a wireless set. He said he was a Mr. Dillingham. He saw a radio set valued at 17 guineas, and asked for it to be delivered to his address. Prisoner again called on Mr. Marshall and gave him two cheques. He said that he had already seen a set valued at £9 that he would like. Later the cheques were returned, marked "No account."

On January 23rd last, Mr. Robinson, another wireless dealer, received a visit from prisoner, who produced a card with the name "G. Milano" on it. He saw several wireless sets and chose one valued at eight guineas. He gave a cheque for that amount, but this cheque was eventually returned marked "Signature differs." On January 27th prisoner called on Mr. Robinson again. Mr. Robinson had already communicated with the police and the prisoner was arrested.

A detective said that the total amount involved was over £250.

MR. BURGESS (for Smith) said that although the number of offences were very numerous they had all taken place within a very short period.

SIR HENRY DICKENS sentenced Smith to nine months' imprisonment in the second division.

## Motor Patent Extension Application.

THE British Thomson-Houston Co., Ltd., has given notice of its intention to apply for a four-years' extension of Patent No. 9,557 of 1915 for the invention of "A method of and apparatus for casting squirrel cages in the magnetic cores of induction motors." Notice of opposition must be lodged with the company's solicitor by March 11th.

## Sequel to an Electrical Fatality.

AT the Newcastle Assizes last week Mrs. Evelyn Henderson was awarded £2,000 damages against Messrs. Gray Bros., Ltd., electrical contractors, Newcastle-upon-Tyne.

It was stated for the claimant that the defendants installed a power plug in her house and one of their employés negligently allowed a screw to penetrate the lead sheathing of the wire. In consequence of this her husband received a fatal shock from the wire while rescuing his son who had come into contact with it.

The electrician who carried out the work admitted that he had not made an insulation test after completion as he had not brought the necessary instruments.

# The Research Association.

## The Tenth Annual Luncheon.

ACCORDING to precedent the annual luncheon of the British Electrical and Allied Industries Research Association followed its tenth annual meeting at the Savoy Hotel, London, on February 13th.

**Sir H. Frank Heath,** G.B.E., K.C.B. (president), occupied the chair and, after the loyal toast, he called upon the company to stand in silent tribute to the late Sir Charles Parsons, a great engineer, great research worker, and man; courage was one of his outstanding qualities. In the future much would depend upon the high-pressure steam turbine, and if ever there had been a man who could have made a success of it he was Sir Charles.

**Mr. C. C. Paterson,** O.B.E. (president of the Institution of Electrical Engineers), in proposing "E.R.A.," remarked that their chairman had at one time been its stern parent and the Council had had to do what he told it. He had brought up the Association well, and now it was fortunate to have him as its president. E.R.A. maintained tradition by showing the instinct to co-operate whenever the interests of the industry needed it. In the Association the industry had a rapidly growing asset.

**Sir H. Frank Heath,** in reply, quoted "old knowledge hinders modern understanding" as his text. Unless the spirit which moved the Association influenced not merely the heads of organisations that supported it, but spread right through the works, the efforts of the Association would not be fully rewarded. The lag between discovery and practical application was too great; not because the captains of industry disbelieved in new ideas, but because their foremen carried on too long in the old ways with the old materials bought in too large quantities. There were things at their very doors ready to be picked up; they must watch for new things in the most unexpected places and realise the significance of comparative trifles. Their methods were frozen; more flexibility was needed in all directions, for they were as yet at the beginning of things. The general public required educating into a belief of what electricity was capable of doing, and even seemingly stupid misconceptions were worth taking into account. The public was becoming more scientifically minded and capable of understanding suitable explanation. The scheme for the establishment of an adequate testing station for dielectrics must be carried out, with or without Government financial aid, and it might literally be a question of hours whether this or some other country was to be first to evolve some really satisfactory method of breaking circuit. A tip for the future was "cellulose acetate" (see reference to cable insulation on board ship on page 325 of this issue.)

**Mr. F. Wallis** (chairman of Council) proposed the health of the president, who briefly returned thanks.

## Uses of Synthetic Resins.

The development of uses for synthetic resins formed the subject of a recent lecture delivered by Mr. E. A. Bevan, B.Sc., of the British Dyestuffs Corporation, before the Institution of the Rubber Industry and the Society of Chemical Industry at Manchester. Imperial Chemical Industries, Ltd., had just put on the market a moulding powder for which a great degree of success was claimed. Resins prepared from phenol-formaldehyde combined to an extraordinary degree heat-resisting and electrical properties, coupled with easy moulding, which had led to their use and rapid development as insulators in the electrical industry, being easier to produce and less brittle than porcelain on the one hand, and more resistant to heat than such materials as shellac, bitumen, or ebonite, claimed the lecturer. The application of those resins in the electrical industry had been hitherto somewhat limited by defects inherent in the material itself, and also on account of lack of uniformity. The figures quoted by manufacturers for the electrical properties of their moulding powders were said to be of little use, since the determination of those properties depended very largely on the methods and conditions under which the various tests were carried out. Systematic research into the methods of electrical testing had been carried out in the laboratories of the British Dyestuffs Corporation at Blackley with a view to defining the operation of phenol-formaldehyde resins as electrical insulators, to discovering the causes of their failure and breakdown, and to finding means of improving the materials and extending their field of application. The dielectric strength of phenol-formaldehyde moulding had been determined under those conditions at which its strength was independent of the time during which the voltage was applied. The electrical properties of mouldings exposed to controlled humidity had also been determined and, in addition, Mr. Bevan dealt with the effects of degree of cure, free moisture content of the powders, and of baking the mouldings on their electrical properties. The lesson of the lecture was that, while the manufacturer could play his part in producing powders suitable for the manufacture of electrical insulators, the moulder had also his part to play if the best results were to be obtained.

# Business and Industrial Notes.

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.**

### Conditions in Guatemala, Honduras and Nicaragua.

The Department of Overseas Trade has published a report (Stationery Office, 2s. 3d. net) on economic conditions in the Republics of Guatemala, Honduras and Nicaragua, compiled by the British Consular officers in those countries. This shows that all three States have been affected by the world depression and the fall in commodity prices, Guatemala and Nicaragua being largely dependent upon their coffee exports and Honduras upon silver. There appears to be little scope for electrical trade. It is mentioned that the Guatemalan telephones are administered by the Government, the plant having been installed by a German concern, while electricity is supplied by a subsidiary of the American General Electric Co. In Honduras much has recently been done to improve and extend the telegraph and telephone systems. One project is the establishment of a new telephone line between Honduras and El Salvador. The Executive has accepted an offer of an American corporation to install automatic telephones in the capital.

### Australian Contracts and the Exchange Situation.

The Department of Overseas Trade has received notification of the decision of the New South Wales Government Railways that overseas tenders must be based on the rates of exchange quoted by the Commonwealth Bank of Australia on the date of the tender. Provision is made for variation according to any later fluctuations in the exchange rates.

### Czecho-Slovakian Government Contract Regulations.

The *Board of Trade Journal* reports that among the recently-published regulations relating to Czecho-Slovakian Government contracts the following appears:—"Tenders submitted by firms established abroad may be considered only when the lowest tender submitted by a local firm exceeds the offer of a foreign firm, minus duty, by more than 20 per cent., and in case the foreign tender, including Customs duty, is no higher than the local tender. Should it be decided that the order or the work to be executed is to be entrusted to a foreign firm, all local tenderers are to be invited in writing to signify within a specified period whether and to what extent they would be prepared to reduce their tenders. These subsequent negotiations with local firms are also permissible when local tenders exceed foreign tenders by more than 20 per cent., minus Customs duty, and when the foreign tenders, plus duty, are higher than the local tenders. The replies received shall be opened and adjudicated in the same way as tenders. When it is a question of the supply of articles produced abroad, the delivery under approximately similar terms is to be placed with local firms."

### A Battery Replacement Service.

An interesting new service for motor vehicle owners, whose vehicles are fitted with C.A.V., Lucas, or Rotax accumulators, has just been arranged by Messrs. JOSEPH LUCAS, LTD., with their 400 battery service agents and at their own depôts in all parts of the country. Under the new scheme at any time during the first two years of the life of the battery the owner can have it exchanged, provided there has been no obvious abuse or accidental damage, for an entirely new battery, the cost of the exchange to the car owner being one twenty-fourth part of the list price for each month since the battery was first put into service. It is stated that the replacement of a battery can be effected in twenty minutes.

### Unemployment.

There was an increase of 12,895 in the number of registered unemployed during the week ended February 9th. At that date the total was 2,637,131, as compared with 2,624,236 on February 2nd, and 1,519,974 on February 10th, 1930.

### Electrical Manufacturing and Supply Profits.

Some interesting figures with regard to the financial position of the British electrical industry are given in the annual financial and commercial review just issued by *The Times*. One table indicates that the reports of eleven manufacturing concerns issued in 1930 showed aggregate net profits of roundly £1,905,000, equal to 8.5 per cent. of the paid-up capital, as compared with £1,697,000, or 8.2 per cent., in 1929. A second table indicates that a total of £1,747,000, representing 7.1 per cent. on paid-up capital, was distributed to the shareholders as against only £1,314,000, or 6.3 per cent., in the preceding year. In a third table it is shown that 82.8 per cent. of the net earnings was distributed in dividends and 17.2 per cent. retained in the business, the corresponding figures in 1929 being 77.5 per cent. and 22.5 per cent. The corresponding figures for electric light and power supply companies based on the 1930 reports of nine undertakings are:—

| | 1929. | 1930. |
|---|---|---|
| Total of net profits ... ... ... | £2,030,000 | £2,172,000 |
| Percentage of paid-up capital ... ... | 9.4 | 8.8 |
| Amount distributed in dividends ... | £1,526,000 | £1,747,000 |
| Percentage of paid-up capital ... ... | 7.1 | 7.1 |
| Percentage of profits distributed in dividends ... ... ... ... ... | 75.1 | 80.4 |
| Percentage of profits retained in the business ... ... ... ... ... | 24.9 | 19.6 |

### New Irish Radio Trade Association.

At a meeting of members of the Irish radio trade held in Dublin last week under the chairmanship of Mr. T. F. Clarke, president of the Irish Radio Traders' Association, it was decided that a new trade organisation to be known as "The Irish Radio Development Association" should be formed with the object of improving radio trade conditions in the Free State. The Association is intended to include as members radio apparatus retailers, manufacturers of radio apparatus with a place of business in Ireland, manufacturers' agents, and wholesalers of radio apparatus. The Association is to be managed by three committees, *viz.*, Retail, Wholesale, and an Executive Committee composed of representatives from the Retail and Wholesale Committees.

### An American Electrical Export Combination.

Two of the largest American electrical concerns, the Westinghouse and the General Electric Companies, have formed an alliance to handle "certain parts" of the export business, subject to the approval of the Federal Trade Commission. The Electrical Apparatus Export Association will be the name of the new exporting undertaking, which will have its headquarters in New York City.—*Reuter* (New York).

### Export Credit Guarantees.

Last week Mr. G. M. Gillett, Parliamentary Secretary to the Department of Overseas Trade, stated that in response to representations by the organisers of the Buenos Aires Exhibition the Export Credits Guarantee Department had decided to send a representative to the Exhibition. By this means applications for credit guarantees in connection with orders placed at the Exhibition would receive immediate attention and the Department's decision could be made known within 24 hours. Mr. Gillett also announced that in addition to the Department's Manchester office, one had been opened in Bradford and other branches were contemplated. For the first time, too, there would be special offices in the London and Birmingham Sections of the British Industries Fair at which the subject of export credit guarantees could be discussed with exhibitors.

### Equipping an All-Electric House.

A correspondent signing himself "Chartered Electrical Engineer" wishes to equip a new house on "all-electric" principles. For this reason he is desirous of comparing the costs of the various methods, and asks interested manufacturers to send pamphlets, lists or suggestions. These should be sent to him c/o the ELECTRICAL REVIEW.

### New Australian Company.

The Willard Storage Battery Co. of Australia, Ltd., was recently registered in Sydney with a capital of £200,000. The first directors are Messrs. R. C. Norberg, S. W. Rolph, C. H. Gibney and I. K. Schnaitter.

### Local Exhibition.

TORQUAY.—The Torquay Electricity Committee is arranging an electrical exhibition at the Town Hall. This will be opened officially on Monday next, February 23rd.

### The Extended Use of Tantalum.

The Imperial Institute has published, through the Stationery Office (price 6d.), a monograph on the tantalum and niobium resources of the British Empire. Before the development of radio communications the commercial development of tantalum was small and spasmodic. The demand for a cheap

and simple means for converting alternating electric current into direct, however, drew attention to the possibilities of metallic tantalum. This demand for the metal led to its production on a much larger scale than before, thus making it available for other commercial uses and enabling its properties to be more thoroughly investigated than had hitherto been possible. The metal is stated to be suitable for many chemical, physical and industrial purposes for which it has become a rival to platinum.

## Bankruptcy Proceedings.

W. A. McKERCHAR, trading as W. A. McKerchar & Son, 23, Skelton Terrace, York Road, Leeds, formerly electrician.—The receiving order in this case was made on the debtor's own petition. At the first meeting of creditors held recently at the Official Receiver's office, 24, Lower Bond Street, Leeds, a statement of affairs was submitted which showed liabilities of £159 and no assets. The case being a summary one was left in the hands of the Official Receiver, as trustee. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Electric Lamp Factors, Ltd. ... ... ... | 35 | Collins, W. E. ... | 49 |
| | | Climax Electric ... | 53 |

C. W. WHITLE, electrical sales engineer, 45, Fife Road, Darlington.—Receiving order made February 11th on debtor's own petition.

S. NICHOLLS (Electrical Wireless & Gramophone Supply Co.), 151, Marlowes, Hemel Hempstead.—First meeting, February 20th, at 29, Russell Square, W.C. Public examination, March 11th, at the Court House, St. Albans.

L. E. CANNON, electrical engineer, Room 327, Grand Buildings, Trafalgar Square, W.C.—Receiving order made February 6th on a creditor's petition. First meeting held February 19th. Public examination April 1st at Bankruptcy Buildings, Carey Street, W.C.

E. C. G. HEFTI, electrician, 10, Dean Road, Scarborough.—Receiving order made February 6th on a creditor's petition.

J. R. KIRK, electrical engineer, 2, Park Villas, Malden Road, Cheam.—First meeting, February 20th at 29, Russell Square, W.C. Public examination March 26th at the County Court, Scarbrook Road, Croydon.

## Company Liquidations.

PARK WIRELESS, LTD., 664, Coventry Road, Small Heath, Birmingham.—The statutory meeting of creditors in this matter was held recently, when the statement of affairs submitted disclosed a total deficiency of about £450. The company was incorporated in 1928 with a nominal capital of £200 in £1 shares, of which £100 had been issued. During the two years' trading net losses of £338 were sustained. The shareholders had already nominated Mr. C. J. Vane, 115, Colmore Row, Birmingham, as liquidator of the company, and the creditors confirmed his appointment.

UNIVERSAL GRAMOPHONE & RADIO CO., LTD.—Winding-up voluntarily. Liquidator, Mr. J. N. Bain, 308, Regent Street, W.

HADDERS INSULATIONS, LTD.—Winding-up voluntarily. Liquidator, Mr. W. E. Thorpe, 5, John Street, Bedford Row, W.C.

H. T. BOOTHROYD, LTD.—Particulars of claims by March 12th to the liquidator, Mr. F. S. Morris, 41, North John Street, Liverpool.

F. PARKS, LTD. (old company).—Meeting to receive an account of the winding up, March 5th, at 167, Strand, W.C.

NORTH LONDON VALVE CO., LTD.—Winding up voluntarily. Liquidator, Mr. D. B. Drake, 11a, Hart Street, London, W.C.1. Particulars of claims by March 5th to the liquidator at the above address.

RADIOGRAPH, LTD.—Winding up voluntarily. Liquidator, Mr. E. H. Francis, 50, Suffolk Street, Birmingham.

ELECTRODUCER, LTD.—Winding up voluntarily. Liquidator, Mr. C. A. G. Hewson, 127-130, Moorgate Station Chambers, London, E.C.2.

STANDARD RADIO CO.—Particulars of claims by March 1st to the liquidator, Mr. W. Peet, 1, High Street, Croydon.

CORFIELDS ARGENTINE TRADING CO.—Meeting at 4, London Wall Avenue, London, E.C.2, on March 18th to receive an account of the winding up of the company.

MIDLAND FACTORS, LTD.—Meeting at 159, Great Charles Street, Birmingham, on March 20th to receive an account of the winding up of the company.

HARGROVE STANLEY, LTD., radio specialists, Gay Street, Bath.—The statement of affairs submitted at a recent meeting of creditors showed liabilities of £1,130 and a deficiency so far as the creditors were concerned of £284. It was reported that the company had been in business for a number of years; during the last six years losses of over £400 had been incurred on trading. A resolution passed by the shareholders for the voluntary liquidation of the company was confirmed.

## Private Arrangements.

W. LEE, 8, Shepperton Road, N., radio, electrical and cycle engineer and dealer.—A meeting of creditors was held on February 9th, when the representative of Messrs. Garnett, Whiteley & Co., Ltd., one of the largest creditors, occupied the chair. It was stated that the debtor had been in the cycle business for about 20 years, and had been successful. In January of last year he decided to extend his business to radio, but that venture, however, proved disastrous. Practically all the goods in that particular trade had been sold for cash, with the exception of one item. In that instance there was an amount of £1,906 owing, and the debtor had been unable to trace the whereabouts of the purchaser. The Sheriff had sold the whole of the debtor's goods and he now had no assets whatever. The liabilities due to trade creditors amounted to roughly £4,500. An offer to distribute £500 amongst the creditors *pro rata* was rejected. After debtor had answered questions, the chairman said that he considered that the matter required the closest investigation, and such an investigation would take place in the Bankruptcy Court. It was stated that there was already a petition on the file for bankruptcy, and it would be proceeded with. The following are the principal creditors:—

| | £ | | £ |
|---|---|---|---|
| Dubilier Condenser Co. (1925), Ltd. ... ... | 93 | Garnett, Whiteley & Co. | 388 |
| | | Lighting Trades, Ltd. ... | 99 |
| Edison Swan Electric Co., Ltd. ... ... ... | 122 | Partridge & Mee, Ltd. ... | 182 |
| | | Selectors, Ltd. ... ... | 95 |
| Emaru, Ltd. ... ... | 100 | Sun Electrical Co., Ltd. | 103 |
| Harris Williams Mfrs., Ltd. ... ... ... ... | 149 | Dibbens, William, and Sons, Ltd. ... ... ... | 257 |
| Houghtons, Ltd. ... ... | 106 | Wingrove & Rogers, Ltd. | 107 |

## Meeting of Creditors.

R. B. HECKIE & Co., LTD., Glasgow.—A meeting of creditors is to be held at the offices of Mr. D. S. Hepburn, 19, St. Vincent Place, Glasgow, on February 23rd.

## Book Notices.

"Patents, Trade Marks and Designs," by H. T. P. Gee. Pp. 47. Published by the author (51, Chancery Lane, W.C.2.). Price 5s.—In this little work a very complicated subject is dealt with in outline sufficiently to indicate what is and what is not patentable (or registrable), how patents or registration of marks are obtained, and what protection is afforded the inventor. The book is divided into six sections. The first is a brief historical survey of the subject, then British and foreign patents and trade marks are separately considered; and the final chapter deals with designs.

We have received a copy of an excellently produced booklet, "Electricity and the Home," issued by the Nottingham Corporation Electricity Department. The pleasing way in which the advantages of electricity usage for all domestic purposes are laid out and illustrated should render this publication a valuable propaganda medium.

Government Department Electrical Specifications. No. 15—1930, Alternating-current Motors (Induction Type). This includes three specifications: (1) from 1 b.h.p. to 100 b.h.p. for continuous service (excluding short-time rated and totally enclosed motors); (2) totally enclosed, from 1 b.h.p. to 100 b.h.p. for continuous service (excluding short-time rated motors); (3) short-time rated, from 1 b.h.p. to 100 b.h.p. (open and totally enclosed types). H.M. Stationery Office, price 6d. net.

"A Tribute to Michael Faraday," by Rollo Appleyard. Pp. xiii+204; illustrated. London: Constable & Co., Ltd. Price 7s. 6d.

The new catalogue of scientific and technical books published by Sir Isaac Pitman & Sons, Ltd., comprises 120 pages and has sections devoted to all branches of the electrical industry.

"Aluminium Facts and Figures." Publication No. 336 of the British Aluminium Co., Ltd., superseding No. 294, gives a wealth of information and data relating to aluminium equipment, including conductors and other materials of special interest to the electrical industry.

"Magnetic Phenomena," by S. R. Williams. Pp. xxii+230; figs. 150. London: McGraw-Hill Publishing Co., Ltd. Price 15s. net.

## New Catalogues and Lists.

SIEMENS BROTHERS & Co., LTD., Woolwich.—A folder, a window bill and a showcard, illustrating the "Full o' Power" radio batteries.

THE LONDON FAN & MOTOR CO., LTD., 81, Charlotte Street, Tottenham Court Road, London W.1.—List L.F.M./31, giving particulars and prices of the company's extensive range of exhaust fans.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—A leaflet depicting the progress made in the manufacture of "Brook" motors. Also a folder giving notes on the company's personnel.

CHARLES SELZ, 47, New Cavendish Street, London, W.1.—A leaflet illustrating the firm's large lampshade showrooms.

WESTON ELECTRICAL INSTRUMENT CO., LTD., 15, Great Saffron Hill, London, E.C.1.—A folder describing the "Weston" Model 539 miniature portable current transformer.

CROMPTON PARKINSON, LTD., Guiseley, Leeds.—A folder showing some of the many applications of the "Parkinson" motor.

RUNBAKEN MAGNETO CO., LTD., Tipping Street, Ardwick, Manchester.—A leaflet describing several new models of the "Nivex" vest-pocket "Detectoscope."

J. H. TUCKER & Co., LTD., Kings Road, Tyseley, Birmingham.—Leaflets illustrating and describing an attractive range of electrical accessories in "Beatl" insulating material.

BAKELITE, LTD., 68, Victoria Street, S.W.1.—The first number of "Bakelite Progress" containing illustrated descriptions of the many applications of bakelite in various industries.

THE AIREDALE ELECTRICAL AND MANUFACTURING CO., LTD., Bowling Old Lane, Bradford.—Leaflet No. 31/12, dealing with a new range of oil break switches.

ROBERT FLETCHER & SON, LTD., Kearsley Paper Works, Stoneclough, near Manchester.—A booklet relating to fine tissues for the manufacture of electrical condensers and thin Manila papers for insulating purposes.

HERBERT MORRIS, LTD., Loughborough.—A brochure describing "Morris" cranes for all purposes.

THE STANTON IRONWORKS CO., LTD., near Nottingham.—A leaflet giving details of the "Stanton Delavaud" spun iron pipes. Also the monthly stock list of cast-iron pipes and special castings.

HUGH J. SCOTT & CO. (BELFAST), LTD., Volt Works, Ravenhill Avenue, Belfast.—A cardboard folder giving particulars and prices of the full range of "Scott" motors.

The MARCONIPHONE CO., LTD., Marconiphone Works, Dagenham, Essex.—A striking display cut-out drawing attention to the universal use of "Marconi" valves.

A. W. BEUTTELL, LTD., 96, Victoria Street, London, S.W.1.—List 28, giving particulars of the No. 2 "Linolite" designed to take a 100-watt double-ended tubular lamp. Also List 29 describing three other new "Linolite" fittings for shop lighting—a bronze showcase reflector, a facia lighting reflector and a shelf sign.

The KEIGHLEY GEAR CO., Aireworth Works, Keighley.—A booklet entitled "Keighley Standard Gears." Reference is made to the large range of "Keighley" stock spur gear drives and standard worm reducing gears.

## Electrical Exhibitors at Buenos Aires.

A number of electrical and allied manufacturers have sent us details of the displays which they are arranging at the British Empire Trade Exhibition, Buenos Aires (March 14th-April 27th). Among these are the General Electric Co., Ltd., Holophane, Ltd., the Igranic Electric Co., Ltd., A. Reyrolle and Co., Ltd., W. T. Henley's Telegraph Works Co., Ltd., Petters, Ltd., Agricultural and General Engineers, Ltd., Pritchett & Gold & E.P.S. Co., Ltd., and the National Gas Engine Co., Ltd.

**A "P.L.A." Diorama at the B.A. Exhibition.**

The G.E.C. has also sent us a photograph of one of the illuminated dioramas which the Port of London Authority is setting up in the Exhibition. This, which is reproduced herewith, is a view of the Royal Victoria and Albert and King George V Docks. The illumination is provided by "Osram" lamps.

## Electrical Manufacturing in Canada.

A report of the Dominion Bureau of Statistics on the electrical manufacturing industry in Canada states that the value of production in 1929 was $113,796,002. The output of this industry has been rapid during recent years, having risen steadily year by year from $56,490,465 in 1924 to the high level now reached. The leading products of the industry were wire and cable, valued at $25,213,303; radio apparatus, excluding batteries, $15,503,460; telephone materials, $8,785,136; transformers, $8,100,294; and batteries and parts, $7,704,000. There were 135 factories engaged in the industry, with a fixed and working capital of $101,767,108, employing a monthly average of 20,871 persons, who received in salaries and wages $26,725,215. The purchased materials cost $49,623,322, and the value added by manufacturing processes $64,172,680. The manufacturing of electrical refrigerators, a new industry for Canada will shortly be commenced by the Norge Corporation of Canada, Ltd., which is being organised as a subsidiary by the De Forest Crosley Radio Corporation, Ltd., Montreal. The company has secured the patents and selling rights for Canada of the Norge Corporation of Detroit.

## For Sale.

The whole of the machinery, plant and stock of a firm of electrical engineers is to be sold by auction on February 24th by Messrs. Marsh Lyons & Co., at 12, Bevington Hill, Liverpool.

An oil engine, generators, and motors are offered for sale by the Streetley Manufacturing Co., Ltd.

Messrs. J. Jones & Co. (Nottingham), Ltd., have for sale a large number of electric motors and dynamos.

(See our advertisement pages to-day.)

## Scottish Contractors' Dinner.

The annual dinner-dance of the Edinburgh branch of the Electrical Contractors' Association of Scotland was held at the North British Station Hotel on February 13th.

Mr. Alexander Pratt, the chairman of the branch, presided, and he was supported by Councillor Walker, the Convener of the Edinburgh Electricity Committee, Mr. H. C. Hazel, the president of the E.C.A., Mr. D. H. Morris, the president of the E.C.A. of Scotland, Mr. Edwin Seddon, chief electrical engineer, Edinburgh, Major Bell, chief electrical engineer, Glasgow, Mr. J. Y. Fletcher, Mr. C. W. Sully and Mr. H. A. Deacon of E.L.M.A., Mr. W. T. Williamson of the Clyde Valley Electric Power Co., Mr. F. C. Vine, of the Accumulator Manufacturers' Association, and several other prominent electrical men.

Mr. Walter Finlay, the secretary, proposed the toast of the guests, and Convener Walker and Messrs. Hazel and Morris responded. Mr. J. Y. Fletcher proposed the chairman's health.

The company numbered about 250. After dinner a large number took part in a whist drive and ultimately the whole gathering assembled in the ballroom, where dancing was carried on until an early hour.

## Prices of Raw Materials.

**The following prices are only general, and they may vary according to quantities and other circumstances:—**

| | CHEMICALS, &c. | Price Feb. 17th. | Fortnight's inc. or dec. |
|---|---|---|---|
| *a* | Acid, Oxalic ... ... ... ... per lb. | 5½d. | ... |
| *a* | Ammoniac, Sal ... ... ... per ton. | £60 | ... |
| *a* | Ammonia, Muriate (large crystal) ,, | £62 | ... |
| *a* | Bisulphide of Carbon ... ... ,, | ... | ... |
| *a* | Borax ... ... ... ... ... ,, | £17 | ... |
| *a* | Copper Sulphate ... ... ... ,, | £25 10s. | ... |
| *a* | Potash, Chlorate ... ... ... per lb. | 3d. to 4d. | ... |
| *a* | ,, Perchlorate ... ... ... ,, | 5½d. | ... |
| *a* | Shellac ... ... ... ... per cwt. | £13 10s. | ... |
| *a* | Sulphur, Commercial ... ... ,, | £11 | ... |
| *a* | ,, Roll ... ... ... ... ,, | £11 | ... |
| *a* | Soda, Chlorate ... ... ... per lb. | 3d. | ... |
| *a* | ,, Crystals ... ... ... per ton. | £5 to £5 5s. | ... |
| *a* | Sodium Bichromate, casks ... per lb. | 3½d. | ... |
| | **METALS, &c.** | | |
| *b* | Aluminium, Ingots ... ... per ton. | £85 to £90 | ... |
| *b* | ,, Wire ... ... ... per lb. | 1/1 to 1/9 | ... |
| *b* | ,, Sheet ... ... ... | 1/1 to 2/9 | ... |
| *b* | Babbitts Metal and Anti-friction Metals— | | |
| | Grade I ... ... ... per ton net. | £115 | £4 inc. |
| | Grade II ... ... ... ... ,, ,, | £84 | £3 inc. |
| | Grade III ... ... ... ,, ,, | £51 | £1 inc. |
| *c* | Brass (rolled metal 2" to 12" basis) per lb. | 7¾d. | ... |
| *c* | ,, Tubes (Solid drawn) ... ,, | 9¾d. to 10d. | ... |
| *c* | ,, Wire, basis ... ... ... ,, | 8¾d. | ... |
| *c* | Copper Tubes (solid drawn) ... ,, | 11d. | ... |
| *g* | ,, Bars (best selected) ... per ton. | £75 | |
| *g* | ,, Sheet ... ... ... ... ,, | £75 | ... |
| *g* | ,, Rod ... ... ... ... , | £75 | |
| *d* | ,, (Electrolytic) Bars ... ,, | £49 17s. 6d. | ... |
| *d* | ,, ,, Sheets... ... ,, | £143 10s. | ... |
| *d* | ,, ,, Wire Rods ... ,, | £59 17s. 6d. | ... |
| *d* | ,, ,, H.C. Wire ... per lb. | 7¼d. | ... |
| *f* | Ebonite Rod... ... ... ... ,, | 2/3 to 2/6 | ... |
| *f* | ,, Sheet ... ... ... ... ,, | 2/3 to 2/6 | ... |
| *n* | German Silver Wire ... ... ,, | 2/1 | ... |
| *h* | Gutta-percha, fine... ... ... ,, | nom. | ... |
| *h* | India-rubber, Para fine ... ... ,, | 4¾d. | ¼d. dec. |
| *i* | Iron, Pig (Cleveland No. 3.) ... per ton. | 58/6 | ... |
| *l* | ,, Wire, galve. No. 8, P.O. qual. ,, | £20 | ... |
| *g* | Lead, English pig... ... ... ,, | £14 15s. | 10s. inc. |
| *g* | Mercury ... ... ... ... per bot. | £22 7s. 6d. to £22 10s. | ... |
| *e* | Mica (in original cases) small ... per lb. | 6d. to 8/- | ... |
| *e* | ,, ,, medium ... ,, | 4/- to 8/- | ... |
| *e* | ,, ,, large ... ,, | 10/- to 20/- & up | ... |
| *p* | Phosphor Bronze, plain castings ,, | 1/1¼d. | ... |
| *p* | ,, ,, drawn bars & rods ,, | 1/0¾d. | ... |
| *p* | ,, ,, rolled strip & sheet ,, | 1/1d. | ... |
| *p* | ,, ,, wire ... ... ... ,, | 1/ ¾d. | ¼d. dec. |
| *o* | Platinum ... ... ... ... per oz. | £6 17s. 6d. | 2s. 6d. inc. |
| *d* | Silicium Bronze Wire ... ... per lb. | 9¾d. | ... |
| *r* | Steel, magnet, in bars ... ... ,, | 7¾d. | ... |
| *g* | Tin, Block (English) ... ... per ton. | £119 5s. to £120 15s. | £6 inc. |
| *n* | ,, Wire, Nos. 1 to 16 ... ... per lb. | 2/11d. | ... |

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

*a* G. Boor & Co.
*b* The British Aluminium Co., Ltd.
*c* Thos. Bolton & Sons, Ltd.
*d* Frederick Smith & Co.
*e* F. Wiggins & Sons.
*f* India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
*g* James & Shakespeare.
*h* Edward Till & Co.
*i* Bolling & Lowe.
*l* Richard Johnson & Nephew, Ltd
*n* P. Ormiston & Sons.
*o* Johnson, Matthey & Co., Ltd.
*p* C. Clifford & Son, Ltd.
*r* W. F. Dennis & Co.

### Callender's Hospital Fund.

The 28th annual report of Callender's Hospital and Distress Fund shows that during the year a total of £833 was disbursed among fifteen institutions, the principal ones being Guy's Hospital (£250), the Erith and District Hospital (£105), and the Metropolitan Convalescent Institution (£79). Assistance was rendered to members in a number of directions. The annual meeting and concert was held on February 7th., Mr. J. Francis Watson presided and an excellent programme was presented to which Callender's Cable Works Band contributed.

### Spanish Brochures for South America.

In our last issue we made reference to three brochures printed in Spanish which had been prepared specially in connection with the British Empire Trade Exhibition at Buenos Aires. We have now received a fourth, produced by Messrs. Crompton Parkinson, Ltd. This deals in an attractive fashion with the company's history and products, and contains a number of excellent illustrations of motors, transformers, rotary convertors, &c.

### E.D.A. Salesmanship Conferences.

At the fifth E.D.A. Salesmanship Conference of the 1930-31 session this (Friday) evening, the chair will be taken by Mr. A. E. McKenzie. The subject is "Electrical Methods—Ventilation and Air Conditioning," and the principal speaker is Mr. J. I. Bernard.

The next conference is to be held on March 13th. The subject will be: "Do We Believe Our Own Story?" Mr. R. W. Kennedy will give an introductory address, and the chair will be occupied by Mr. A. C. Cramb, the Director and Secretary of E.D.A.

### Recent Contracts.

The Mirrlees Watson Co., Ltd., Glasgow, has recently received two important pumping contracts. The first is for the Sewage Department of the London County Council, for Deptford Pumping Station, and consists of two vertical-spindle pumps, each to deal with 72 tons of sewage per minute against a head of 24 ft., and one larger pump for 108 tons per minute against the same head. The driving units are vertical electric motors, rated at 190 and 290 h.p., respectively. Piping, valves, electrical controls, and an overhead crane are also included in the contract. The second contract is the fourth which the company has received for pumps from the Calcutta Electric Supply Corporation, Ltd., apart from condensing plant. It consists of four vertical-spindle pumps, each to handle 10,000 gallons per minute against a head of 40 ft. The electric motors driving the pumps are each rated at 167 h.p.

The Underfeed Stoker Co., Ltd., informs us that a decision has now been reached regarding the firing equipment to be applied to the eight large boilers for the new 30,000-kW power plant to be installed in the Copenhagen Municipality's power station. The stokers will be Underfeed Class "L" design, each boiler being fitted with a twin machine 6.8 metres wide by 6.8 metres long, giving a total grate surface of nearly 500 sq. ft.

### Trade Announcements.

The "Glamat" method of indelibly marking electric lamps has been purchased by Mr. P. R. S. Vincent, Abbey House, Victoria Street, S.W.1, and is now being marketed by the Glamat Co. of that address.

Mr. G. H. Barton, electrical engineer, Boston, has opened a branch business at The Crescent, Spalding.

The Bombay branch of the General Electric Co. (India), Ltd., has been transferred from Hornby Road to the Kaiser-i-Hind Building, Ballard Estate, Bombay.

The telephone number of the Hull branch of the G.E.C. has been changed to Central 34625/6.

Messrs. S. O. Bowker, Ltd., agents for Mr. J. Martin Blair and "Ramie" connectors, have moved their office to 20, Branston Street, Birmingham.

Messrs. Drake & Gorham Wholesale, Ltd., 77, Long Acre, W.C.2, have been appointed sole distributing agents for the "Runbaken" vest-pocket "detectoscope."

*Reuter's Trade Service* (Bombay) reports that the British Thomson-Houston Co. (India), Ltd., a company established in India as a separate entity in 1924, has changed its name to Associated Electrical Industries (India), Ltd. The new company will act as agents not only for the Thomson-Houston Co., Ltd., but also for the Metropolitan-Vickers Electrical Co., Ltd., the Edison Swan Electric Co., Ltd., and Ferguson, Pailin, Ltd.

### Social Events.

At the invitation of the directors, the employés of Messrs. A. P. Lundberg & Sons, Ltd., on February 7th, took part in a social evening at Rawdon Hall, Holloway, N. A large company was present, and was entertained by a varied programme, which included magical, ventriloquial, and other items provided by Mr. and Mrs. Kirk. During the evening Mr. G. C. Lundberg, on behalf of the directors, presented Mr. A. Partridge with a gold watch, suitably inscribed, to commemorate his meritorious achievement of 20 years' service without loss of time.

The Newcastle Electric Supply Co., Ltd., recently held its annual dance in the Oxford Galleries, Newcastle, 1,000 guests being present. An innovation in the form of a bridge drive was well patronised, the programme being arranged by Mr. J. W. Watson, assisted by Mr. A. A. Dunn. Mr. P. Richardson's band provided music.

# Lighting and Power Notes.

**Barking.**—New Cables.—The Urban District Council Electricity Committee has instructed the electrical engineer to prepare estimates for the work of laying additional cables to provide for an increased supply of 260 kW to Messrs. J. J. Masters & Co., Ltd.

**Barnard Castle.**—Overhead-lines Decision.—The Urban District Council has not been successful in its appeal against the Durham & Cleveland Electric Power Co.'s application to place overhead lines along the Darlington Road to supply electricity to Marwood. After an inquiry the Ministry has upheld the Power Co.'s application.

**Bradford.**—Extension of Tramway Feeder.—The Corporation Electricity Committee recommends that the negative feeder on the Thornton tramway route be extended for a distance of 950 yards at an estimated cost of £1,567.

**Canada.**—Extensions at Grand Falls.—The St. John River Power Company, a subsidiary of the Canadian Hydro-Electric Corporation, has placed in commercial operation its fourth 20,000-h.p. unit at Grand Falls, N.B. The completion of the new unit raises to 80,000 h.p. the installed capacity of the Grand Falls generating station, already the largest electric development in the Maritime Provinces.

Electrical Development.—The Ontario Hydro-Electric Power Commission has contracted with the MacLaren Quebec Power Company for the supply of 125,000 h.p. of electrical energy at a cost of $1,875,000 per annum. The power will be supplied from the company's development near Buckingham, Quebec, at Masson Falls on the Lièvre River. The MacLaren Company proposes to proceed immediately with the development of 130,000 h.p. at Masson Falls and has awarded the contract for its construction to the Foundation Company of Canada, Ltd.

**Carlisle.**—New Industrial Consumers.—The Corporation Electricity Committee is to give a supply of electricity to the Denton Pit of the Naworth Collieries Co., Ltd., the Brickworks at Kirkhouse, and other industrial consumers in the Brampton neighbourhood, at a cost of £4,850.

**Colchester.**—Assisted Wiring.—The Corporation Electricity Committee is applying for sanction to a loan of £15,000 for assisted wiring installations.

Extensions.—The Electricity Committee has decided to commence the following l.p. distribution schemes:—Kirby-le-Soken, estimated cost, £980; Mistley, £2,083; Lawford, £650; Brightlingsea Road, Thorington, £260; and Ainger's Green, £250.

**Congleton.**—Inauguration of Supply.—The inauguration of the Corporation electricity undertaking is to take place to-day at the sub-station in Bromley Street. The formal lighting of the Town Hall will follow and afterwards a dinner will be held in the Court Room.

**Continental.**—Czecho-Slovakia.—The country's scheme of electrification is being carried out according to programme. At the end of 1929 the number of parishes supplied with electricity was 4,500, and at the end of 1930 the number had risen to 8,400. Only 7,000 parishes are now left to be supplied within the next five years.—*Reuter's Trade Service* (Prague).

Russia.—According to a report recently issued by the German offices of the Soviet Russia Department of Commerce, it is estimated that the total capacity of electricity generating plant in Soviet Russia will amount to 4,500,000 kW by the end of the year, and that the output of electric power this year will reach a total of 12,700 million kWh, as compared with 8,800 million kWh in 1930.

France.—The French Government has recently granted a concession to the Société des Products Azotes of Paris for the establishment of a hydro-electric station to utilise the water power of the River Neste-du-Louron, near Loudenville, Hautes Pyrenees.

**Coupar Angus (Perthshire).**—Street Lighting.—The Town Council has decided to instruct an expert engineer to prepare specifications and advise the Council in regard to street lighting.

**Dutch East Indies.**—Electrical Power Development.—The Water Power and Electricity Department of the Dutch East Indies Government states in its annual report for 1929 that steady progress continues to be made in the use of electricity. Considerable extensions of the distribution network were carried out during the year, notably a 37½-mile double transmission line between Plengan and Garoet, a 20-mile extension from Garoet to Singaparna, and a 14-mile single line between Poerwakarta and Kosambi, in West Java, bringing the State 25-kV distribution up to about 80 miles of double and 50 miles of single transmission lines. The 70-kV network has also been increased to nearly 80 miles. Excluding the electrical plant in Government and private works, the capacity of the electricity generating stations in the Dutch East Indies at the end of 1929 was:—Private undertakings 76,700 kW, and Government plant 47,400 kW, the total of 124,100 kW comparing with 109,000 kW at the end of 1928.

**East Ham.**—STANDARDISATION OF SUPPLY PRESSURE.—The Corporation Electricity Committee recommends that application be made to the Electricity Commissioners for sanction to change the pressures of the d.c. supplies to 230 V and 460 V as from October 1st next. Standard pressures are already in use in those parts of the East Ham area receiving a.c. supplies.

EXTENSIONS.—The Electricity Committee is to extend distributor cables at a cost of £4,574 and install additional plant at Church Road sub-station at a cost of £4,758.

**Grimsby.**—EXTENSIONS.—The Corporation Electricity Committee recommends that application be made for sanction to loans of £29,745 for sub-stations and cables, and £38,500 for unspecified distribution works.

**Hastings.**—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend overhead lines along Blackhorse Road, Battle, to Telham Hill, at an estimated cost of £560. Mains are also to be extended, at an estimated cost of £1,412, to supply houses to be erected in Old Harrow Lane, Sedlescombe Road North, and on the Hollington housing estate.

**Hertford.**—ELECTRICITY SUPPLY AGREEMENT.—The Town Council has decided to enter into an arrangement with the North Metropolitan Electric Power Supply Co., by which the Corporation will not exercise its right to purchase the electricity undertaking for 42 years from March 29th, 1931.

**Hull.**—PROGRESS IN CABLE-LAYING.—Since December 1928 the Corporation Electricity Department has laid 132 miles of cables, consisting of 87 miles of cables and distributors for ordinary extensions of mains and services, and 45 miles of l.p. cable, in connection with an unemployment scheme costing about £109,000. The latter has been laid during the last 12 months. The staff of the Department has been increased from 240 in 1928 to 404 in 1931.

FINANCE.—At a meeting held recently the City Council reversed the decision of the Electricity Committee to appropriate from the profits of the Electricity Department a sum equivalent to one half per cent. of the outstanding capital of the undertaking, namely, £9,900. It was contended by those who wished to appropriate the amount that the electricity undertaking was able to secure money for development at a cheaper rate because of the security of the city's rateable value. Those against the appropriation argued that it was bad finance to subsidise the rates from trading undertakings and that, as the Electricity Department was considering further reductions in the tariffs, the withdrawal of a sum of £9,900 would hamper its further development.

**Ipswich.**—ADDITIONAL PLANT REQUIRED.—The Corporation Electricity Committee has decided to install an additional mercury rectifier at the Corn Exchange sub-station, at a cost of £2,200. The Committee also reports that owing to the increased traction load it is necessary to install a 1,000-kW convertor costing £4,723.

**Japan.**—NEW POWER COMPANY.—The establishment of a new power company, the Kwansai Kyodo Karyoku K.K., has been decided upon. It is expected that three 35,000-kW generating sets will be required initially.

**Liverpool.**—MAINS EXTENSIONS.—The Corporation Electricity Committee has decided to extend h.p. and l.p. mains and equip a proposed new sub-station at Eaton Road, West Derby, at a cost of £3,790. Extensions are also to be carried out to the underground and overhead mains to supply houses on the Knotty Ash housing estate at a cost of approximately £540.

**London.**—ELECTRICITY AND GAS FOR COUNCIL HOUSES.—It is recommended by the London County Council Housing Committee that tenants of Council houses shall be given the choice of electricity or gas in their homes, provided that no additional charge on the rates is involved.

**Luton.**—EXTENSIONS.—The Corporation Electricity Committee is to extend the electricity supply to Caddington Markyate and Kensworth at a cost of £11,766.

**Nelson.**—ADMINISTRATION.—The Town Council has approved a scheme for the re-organisation of the electricity and tramway departments. Both are to continue to be dealt with as one department, and applications are to be invited for the position of electrical engineer at a salary of £700, rising to £800, with an allowance of £100 a year for private motor car. The person appointed will have to supervise the tramway and omnibus undertakings. The proposals also provide for the transfer of the manager of the showroom, and an assistant to another department, and the appointment of a salesman for the showroom. Investigations show that various employés are superfluous, but rather than dispense with their services the Council has decided to transfer them to other positions or place them on a system of short time.

**Oldham.**—CO-OPERATION OF ELECTRICITY AND GAS DEPARTMENTS.—A joint meeting of the Corporation Electricity and Gas Committees was held recently to discuss the possibility of preventing unnecessary competition.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

LOUGHBOROUGH.—Industrial power: A reduction of 15 per cent.

BALLYMONEY (NORTHERN IRELAND).—Lighting: From 1s. 3d. to 1s. per kWh.

**St. Helens.**—ASSISTED WIRING SCHEME.—The Town Council has put in force an assisted wiring scheme for houses. The price per light is 27s. 6d. and payments will be spread over three years as follows: A first payment of 2s. 6d. per light on signing the agreement, and the balance spread over three years by 12 quarterly payments of 2s. 1d. per light.

**South Africa.**—JOHANNESBURG.—In connection with the proposal to the Johannesburg Municipality to raise a loan of £500,000 for additions to the Jeppe power station, the Electricity Supply Commission, while recognising the need for these extensions in the near future, has suggested that the Council shall consider asking for a quotation from the Victoria Falls Power Co. for the extra energy now required. The demand is estimated to reach 40,000 kW in 1935, and the extensions now suggested would give a generating capacity of 60,000 kW.

**South-East Kent.**—ALTERNATIVE TARIFFS.—The South-East Kent Electric Power Co. has adopted the following alternative tariffs:—Domestic consumers (Deal, Walmer and Sandwich): Standing charge of 15 per cent. per annum of the rateable value, plus 1½d. per kWh. Domestic consumers (Eastry and Sandwich Bay): Standing charge based on the external measurements of the premises, plus 1½d. per kWh. Business consumers (all districts): Standing charge of 7s. 6d. per quarter per 100 watts of lighting installed, plus 1½d. per kWh for electricity used for all domestic and approved business appliances.

**South Shields.**—MAINS EXTENSIONS.—The Corporation Electricity Committee is applying for sanction to a loan of £10,000 for the provision of mains.

**Swansea.**—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at a cost of £1,300.

**Thirsk.**—NEGOTIATIONS FOR SUPPLY.—The Rural District Council has decided to withdraw its opposition to the proposal of the Central Electricity Board to erect overhead lines through the district and has instructed the clerk to enter into negotiations in order to obtain an electricity supply for the villages.

**Tilbury.**—ASSISTED WIRING.—The Urban District Council has applied for sanction to a loan of £5,000 for wiring installations under hire or hire-purchase agreements.

**Walsall.**—EXTENSIONS.—The Corporation Electricity Committee is to extend mains and provide new sub-stations and equipment at a cost of £13,100.

**Warrington.**—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to the borrowing of £2,520 for mains.

**Whitehaven.**—REDUCTION IN POWER CHARGES.—The Town Council has reduced the charge for electricity for power in excess of 12,000 kWh per month to 1d. per kWh

**Wolverhampton.**—ASSISTED WIRING.—Application is to be made by the Town Council for sanction to the borrowing of £102,809 in connection with the assisted wiring scheme.

# Tramway and Railway Notes.

**Australia.**—TRANSPORT MONOPOLY IN NEW SOUTH WALES.—A Bill being introduced into the Legislative Assembly provides for the complete monopoly of the transport in New South Wales. If the Bill is passed, the existing Railway Commission, the Transport Trust, and the Main Road Board will be abolished and a Minister of Transport created. A single chief commissioner will be appointed who will be responsible to the minister for the administration of the whole of the services.

**Continental.**—ITALY.—The Societa Tramvie del Friuli has recently secured a concession to construct and operate an electric tramway between Bivio Cassaco and Tarcento.

BELGIUM.—At a recent meeting of the Conseil Superieur des Transports in Brussels the question of dealing with the growing congestion of traffic in Brussels was considered. While it was agreed that electric tramways were still the most economic method of surface transport, it was felt that something must be done to relieve the street traffic. The proposal to construct an underground electric railway has after full consideration been rejected on the grounds that the cost of the line would be greater than the traffic returns would justify. Instead, the Council has resolved to put forward a scheme to utilise the bed of the river Senne which runs underground through Brussels for the tramways running between the Nord and Midi railway stations. The course of the river is at present being diverted, a work which is expected to be completed in 1934 and which will leave the old river bed dry. The two railway stations are at opposite ends of a long straight boulevard, and to remove the tram lines from the latter, short inclined tunnels will have to be constructed to link up with the river bed which for a considerable distance lies practically below the boulevard. The cost of the scheme is estimated at about £650,000, which, however, would be increased to about £1,140,000 by the provision of modern rolling stock.

**Leeds.**—FINANCIAL PROSPECTS.—It is stated to be likely that on the issue of the annual report of the Tramways Department for the past year there will be shown a surplus of £65,250, as compared with £56,943 in 1929. The expenditure of the Department during the year was £10,000 less than the esti-

mates. A higher expenditure will, however, be involved in the coming year, and £30,000 has been allocated for repairs and maintenance, and £82,490 to permanent way renewals. The estimated profit for the next year, therefore, is only £45,740. Passenger receipts during the past year have exceeded the estimate by £10,000.

**Oldham.**—Penny Fares Again.—The Corporation Tramways Committee has decided to re-establish the penny fare, which was abolished about twelve months ago in favour of a minimum adult fare of three-halfpence. The distance which can be travelled for a penny is, however, to be reduced to three-quarters of a mile.

**Plymouth.**—Tramway Abandonment.—A scheme for the gradual abolition of the tramways and the substitution of 'buses has been adopted by the City Council.

**South Africa.**—Johannesburg.—The general manager of the Municipal Electricity Department estimates that £94,000 will be required within the next three years for renewals of tramway tracks. He states that it has now been conclusively proved that tramlines built on rigid foundations are unable to stand up to fast and heavy modern tramway traffic, and that in the United States all the lines of the big tramway undertakings are now laid on buried sleepers.

**South Shields.**—New Tramcar.—A new type of tramcar, which will be in commission shortly in South Shields, has been constructed by the workmen of the Corporation's tramcar depôt to the design of Mr. J. Austin-Baker, the tramway general manager. The interior of the tram is of mahogany relieved with English oak panels. The rattan-caned seats are provided with 25 coil springs and under each seat is an electric heater. The car is illuminated by 60-watt gasfilled lamps. The Tramways Committee will inspect the new car after which it will be placed in regular service.

# Telegraph and Telephone Notes.

**Australia.**—Long-distance Telephony.—Telephone connection between east and west Australia was officially inaugurated when the Federal Postmaster-General in Melbourne spoke to the Prime Minister of Western Australia in Perth. By the conversion of a pair of wires of the telegraph system between Adelaide and Perth a section of 1,629 miles was completed, so that the whole of the States, except Tasmania, are now connected.

**East Africa.**—Automatic Telephony.—The Postmaster-General of Southern Rhodesia states that he has made arrangements for the installation of automatic telephones at Bulawayo to be commenced shortly.

**Italy.**—Vatican Station.—The short-wave radio station which Marconi's Wireless Telegraph Co., Ltd., has built in the Vatican City, Rome, was formally inaugurated by the Pope on February 12th, and the ceremony was relayed by several Italian and B.B.C. stations. The plant was made at the company's Chelmsford works, and includes the Marconi-Franklin valve master drive for the shorter of the two wave-lengths, 19.84 and 50.26 m. For telephony the transmitter is rated to deliver from 8 to 10 kW of unmodulated carrier-wave energy to the aerial-feeder system, the output depending slightly on the wave-length used; the normal degree of modulation is 80 per cent. The rating for continuous-wave high-speed telegraphy is from 13 to 15 kW to the aerial feeder. Two transmitting aerials of the "Uniform" type have been provided, one aerial for each wave-length. Both are suspended and insulated from a triatic slung between two self-supporting lattice steel towers 200 ft. in height and 296 ft. apart. The energy from the transmitter building is conveyed to the two aerials by two separate concentric copper tube feeders, and a tunnel 141 ft. long passing under a 45-ft. old Roman wall has been constructed to accommodate them. A special receiver will secure good telephone and telegraph duplex communication between the Vatican City and any part of the world. It utilises a vertical antenna placed only a few yards from the sending antennæ. The receiving antenna is suspended from the same triatic which carries the sending aerial and its length is adjustable from the receiving room. The new station has been erected by Italian engineers under the personal supervision of the Marchese G. Marconi, and during tests has carried out good clear telephone communication with Australia, India, South Africa, Argentina, Canada, the United States, and with London, Paris, Berlin, Madrid, and other European capitals.

**Radio-telephony.**—Long-distance Record.—A new record in long distance ship-and-shore radio-telephony was established by the International Marine Radio Company on February 13th, when telephone talks were exchanged between the Red Star liner *Belgenland* and two London newspapers. At the time of the call the ship was nearly 7,000 miles away (in the Fermosa Channel, between Hong Kong and Shanghai). The messages passed directly (not *via* New York) between the ship and land, passing right across Asia and Northern Europe to London. The apparatus in the *Belgenland*, the short-wave transmitters and receivers at Rugby and Baldock, respectively, and the terminal equipment at the Post Office, London, trunks exchange were all made by Standard Telephones & Cables, Ltd. The reception was remarkably clear and conversations of several minutes' duration were carried through without interruption. The equipment in the *Belgenland* is capable of working on wavelengths of from 13 to 110 metres, but most of the conversations during the voyage have been on wavelengths varying between 20 and 35 metres. Naturally the range depends largely on the use of directive antennæ and the correct frequencies having regard to the time and the position of the ship.

**The Telegraph Service.** — Finance.—The commercial accounts of the Post Office for the year ended March 31st, 1930, show that revenue increased by 3.41 per cent., while expenditure decreased by 2.24 per cent.

**The Telephone Service.** — Finance.—The commercial accounts of the Post Office for the year ended March 31st, 1930, show that telephone revenue increased by 7.69 per cent.; expenditure, including interest on capital, increased by 9.91 per cent. P.O. capital expenditure during the year amounted to £10,809,276, "mainly on the expansion of the telephone system."

Liverpool Progress.—The local Advisory Committee's report for 1930 (South Lancashire district: Mr. T. E. Herbert, superintending engineer) shows that rural automatic exchanges were opened at Hale (Widnes) and Knowsley; a new manual exchange replaced the existing exchange at Neston, and extensions of existing equipment were carried out at Lymm, Mossley Hill, and Rock Ferry. Buildings were completed for new automatic exchanges at St. Helens and Prescot and a new rural automatic exchange at Lydiate was authorised. The net increase in the number of new telephones fitted, after allowing for cessations, was 2,354, or 3.24 per cent., which is not so satisfactory as in the previous year and shows a further decline in the net increase of telephones in this district due largely to the exceptional number of cessations consequent upon the prolonged trade depression. The number increased from 34,900 in September, 1912, to 74,998 in September, 1930, a growth of 114.83 per cent. in 18 years.

A new main cable from Liverpool to Manchester and Huddersfield contains special screened conductors for the use of the British Broadcasting Corporation from its new north regional station at Moorside Edge to Manchester and Liverpool. A new cable from Liverpool to Birmingham (replacing an old one which contained only 52 pairs of heavy-gauge conductors) occupies the same pipe and contains 348 pairs of smaller-gauge conductors. The use of the small-gauge conductors has been made possible by the introduction of repeaters (valve amplifiers) and the new cable has thus nearly seven times the circuit capacity of the old one it replaces.

The increase in the number of calls dealt with in the district amounted to about half a million, 70¾ millions total.

**West Indies.**—Radio-Telephony.—The Bell Telephone Company of Canada has completed arrangements with the American Telephone and Telegraph Company for direct wireless-telephone communication with Bermuda and other islands of the West Indies.—*Reuter's Trade Service.*

# Radio Notes.

**Canada.**—Licences.—During the first nine months of the present fiscal year 48,385 more receiving licences were issued than during the whole of the fiscal year 1929-20, the number for the nine months of 1930-31 totalling 472,531. In spite of the general increase in Canada, licences issued in the western provinces of Saskatchewan and Alberta show a falling-off, no doubt owing to the abnormal economic conditions existing there; a slight decrease has also occurred in the number issued in the Northwest Territories.—*Reuter's Trade Service* (Ottawa).

**France.**—Radio Interference.—It is reported that the Minister of Public Works has appointed a special commission to study the subject of electrical interference with radio reception and to suggest means of preventing its occurrence.

**Holland.**—Licences.—Whilst licences are not issued, the law requires receiver owners to register at their local post offices. On January 1st, 1931, the number of privately-owned sets was 253,527 and, in addition, 173,703 persons having extensions from sets owned collectively were registered. Therefore, the percentage of listeners was about 55 per 1,000 of the population.

The transmitting power of the Hilversum station is shortly to be materially increased.

**Radio Exchanges.**—First in London.—The first broadcasting exchange to be established in the metropolis was opened on February 14th at Bowes Park, Wood Green, north London. Some 250 houses are to be served, and similar exchanges are contemplated in other parts of London.

**Switzerland.**—New Station.—The new Geneva station has been completed. Its 1½-kW aerial masts are of steel, being situated on the Plateau de Lancy, much closer to the town than the former provisional transmitter. The Geneva Broadcasting Company formerly could transmit only during the even-

ing from 6 p.m. onwards, and in summer only after 8 p.m., owing to its having to use the transmitter of Cointrin when it was not required for the air service. The latter had a power of only about 250 watts, so that the new station is a least four times as strong. Geneva required a relay of its own, as the French-Swiss high-power transmitter at Sottens is close to Lausanne and would hardly have given Geneva crystal reception. *World-Radio* understands that Sottens also will begin testing shortly.

**The U.I.R.**—INTERFERENCE PROBLEM.—The Union Internationale de Radiodiffusion concluded its meeting at Semmering, Austria, last week-end during which it elaborated proposals to be utilised by Governments in their reconsideration of the Radio Telegraph Convention of Washington (1927), which is to be revised at Madrid in 1932. The proposals can be divided into (*a*) those concerning the redistribution of wavelengths and (*b*) stricter technical rules for the operation of various services and better use of the possibilities of modern technique. The U.I.R. has further arranged to carry out a series of tests during the next few months in which members of the Union in fifteen European countries will undertake to measure the field strength at which some thirty of the principal European broadcasting stations are received in their countries; it is thus hoped to obtain information which will lead to a solution of the problems of interference created by the ever-increasing power and number of stations. For this all-important work the Brussels checking station is to be extended and brought completely up-to-date.

Replies were also approved to certain technical questions put to the Union by the International Consultative Committee for Radioelectric Communications, and a delegation was appointed to attend the forthcoming conference of that body at Copenhagen in June. The U.I.R. further studied at Semmering various problems concerning the use of international telephone lines for the relaying of programmes from long distances, and appointed its delegates for the forthcoming meetings of the International Consultative Committee for Long-distance Telephony, which will take place at London and Prague in the next few months. Studies have also been started of an international Statute of Radiodiffusion.

The Institut National Belge de Radiodiffusion has been accepted as a member of the Union, while Radio Rabat, Morocco, has been accepted as an associate member.

A very successful demonstration of a travelling microphone was given by the Austrian broadcasting organisation (Ravag). It consists of a short-wave transmitter which, together with the necessary microphone and amplifier gear, is mounted in a motor-van, arrangements being made for transmission to take place while the van is in motion.

**United States.**—RECEIVER TAX ILLEGAL.—An important legal precedent has been established by the decision of a Federal Court, which was called upon to test the validity of a law passed last year by the State of South Carolina providing for a graduated tax on wireless sets, the first attempt in the United States to raise revenue by this means. It proposed to levy on all owners of receiving sets in South Carolina an annual tax, rising progressively to a maximum of $2.50 (10s.) per set, and the Federal District Court for the Eastern District of South Carolina held that the law was unconstitutional, as being an interference with inter-state commerce (which is under the jurisdiction of the Federal Government) and could not, therefore, be enforced. It held that station WBT, a party to the action, was engaged in inter-state commerce, as its programmes were received beyond the confines of its state of domicile. According to *World-Radio*, a decree was granted restraining the collection of the proposed tax. The action was brought by station WBT, of Charlotte, North Carolina, a retail wireless dealer, and a broadcast listener.

# Contract Information.

**When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.**

## Contracts Open.

**Australia.**—MELBOURNE.—Posts and Telegraphs Department. March 31st. Single- and double-wound resistance spools. (A.X. 10754.)* Lead-covered telephone switchboard cable. (A.X. 10753.)*

April 7th. Testing instruments. (A.X. 10755.)*

SYDNEY (N.S.W.).—April 8th. Government Railways. One 2,500-kW alternator for Lithgow power station. (A.X. 10761.)*

MILDURA (VIC.).—March 14th. Town Council. 1,000-kW steam turbo-generator and equipment. (A.X. 10766.)*

**Aylesbury.**—March 2nd. Electricity Department. General stores for twelve months. (February 13th.)

**Bedford.**—February 27th. Electricity Department. E.h.p., h.p., and l.p. underground cables. (February 13th.)

**Belgium.**—BRUSSELS.—March 4th. Telegraph & Telephone Department. Supply and laying of telephone cables between (1) Ghent and La Panne, (2) Brussels and Dinant, (3) Brussels and Mont Saint Jean, (4) Charleroi and Mons, (5) Mons and the French frontier, and (6) Liège and the German frontier. Particulars (Cahier des Charges Special No. 3542) for 25 fr. from Régie des Télégraphes et Téléphones.

IXELLES.—February 26th. Administration Communale. H.p. and l.p. armoured cable. Specification (Cahier des Charges) from Service de l'Electricité, 20 Rue d'Alsace-Lorraine.

**Blackburn.**—March 9th. Electricity Department. Cable, wire and meters. (February 13th.)

**Blackpool.**—Corporation Baths Committee. Public address and music reproducing apparatus. (February 13th.)

**Bradford.**—March 5th. Corporation. Two water-tube boilers. (February 13th.)

**Cardiff.**—March 9th. Electricity Department. Transformer, switchgear, and cables. (February 13th.)

**Dundee.**—March 11th. Electricity Department. Coal and ash handling plant. (See this issue.)

**Eccles.**—February 23rd. Electricity Committee. L.p. paper and fibre insulated cables. Specification and form of tender from borough electrical engineer, Electricity Works, Cawdor Street, Patricroft.

**Edinburgh.**—March 12th. City Council. Underground cables, conduits, fuse boxes and boards, meters, link disconnecting boxes, &c. (February 13th.)

**Egypt.**—CAIRO.—March 31st. Ministry of Public Works. Supply and erection of h.p. overhead transmission lines in isolated basins of Upper Egypt. Copy of specifications and conditions of tender can be obtained from the Office of the Chief Inspecting Engineer of the Egyptian Government, 41, Tothill Street, Westminster, S.W.1, against payment of £E10.—*Reuter's Trade Service* (Cairo).

April 18th. Ministry of the Interior. Ice-making plant and accessories. (A.X. 10785.)*

**Fleetwood.**—March 2nd. Electricity Department. Rotary convertors, transformers, and switch panels. (February 13th.)

**Glasgow.**—February 25th. Education Department. Installation of electric lighting at Ruchill School. Specifications (deposit £1 1s.) from education offices, 129, Bath Street.

March 4th. Commissioners of H.M.Works. Installation of a water heating installation at new Central Employment Exchange and Inland Revenue Building, Waterloo Street. Forms of tender (£1 1s.) from engineer, H.M. Office of Works, 122, George Street, Edinburgh.

**Harrogate.** — February 27th. Electricity Department. General stores for twelve months. (February 6th.)

**Heston and Isleworth.**—March 6th. Electricity Department. H.p. cables, rectifier, transformer and switchgear. (See this issue.)

**Liverpool.**—February 26th. Electricity Supply Department. Forty 20-ton steel hopper bottom coal wagons. (See this issue.)

**London.**—CENTRAL ELECTRICITY BOARD.—February 23rd. Construction of site works, foundation works and buildings in connection with the North-East England Electricity Scheme. (January 30th.)

March 2nd. Central indication and telephone equipments in connection with the South-East England Electricity Scheme. (January 16th). Construction of central control station building at Leeds in connection with the Mid-East England Electricity Scheme. (February 6th.)

March 9th. 33-kV overhead transmission lines in connection with the North-West England and North Wales Electricity Scheme. (January 30th.)

March 16th. Construction of site works, foundation works and buildings at Barton and Warrington in connection with the North-West England and North Wales Electricity Scheme. (See this issue.)

**Hammersmith.**—February 25th. Borough Council. General electrical stores for twelve months. (January 30th.)
Electricity Department. Air-cooled transformers. (See this issue.)
County of London Electric Supply Co., Ltd.—March 18th. Condenser tubes in connection with the Barking power station extensions. (See this issue.)
April 1st. Boiler house coal-handling plant in connection with the Barking power station extensions. (See this issue.)

**Long Eaton.**—March 12th. Electricity Department. Twelve months' supply of cables, meters, cut-outs, &c. (See this issue.)

**New Zealand.**—Wellington.—Public Works Department. April 28th. 5,000-kVA 66/33-kV transformer bank for Lake Coleridge power development. (A.X. 10768.)*
April 9th. Government Railways. Transformers, armoured cable, instrument transformer, cable boxes, instruments, static condensers, and isolating links. (A.X. 10758.)*
April 14th. Four single-phase 110-kV transformers. (A.X. 10721.)*
Post and Telegraph Department. March 19th. 300 indicator alarm fuses. (A.X. 10747.)*
March 31st. 500 five-conductor cords. (A.X. 10746.)*
April 2nd. 880 yards of lead-covered telephone cable. (A.X. 10769.)*

**Northern Ireland.**—Belfast.—March 4th. Police Committee. Automatic traffic-control equipment. (January 30th.)

**Pontefract.**—February 23rd. West Riding Education Committee. Electric lighting installation at King's School. Specifications from education officer, County Hall, Wakefield.

**Portsmouth.**—March 18th. Corporation. Installation of electric lighting at sewage collecting tanks, near Fort Cumberland. (See this issue.)

**South Africa.** — Cape Town. — Electricity Department. March 12th. Airport illuminating equipment. (A.X. 10752.)*
Barberton.—March 12th. Municipal Council. Hydraulic pipe line and hydro-electric generating set of 150 kW. (G.X. 10074.)*
Durban.—March 2nd. Corporation. Overhead line equipment. (See this issue.)
Port Alfred.—March 14th. Municipal Council. Electrical plant, including engines and alternators, steel poles, copper wire, insulators, switchboard, meters, house service fuses, and street lighting suspension fittings.

**South Kirkby.**—February 28th. West Riding Public Health and Housing Committee. Electric lighting installation at tuberculosis dispensary, Carr Lane. Specifications from West Riding architect, County Hall, Wakefield.

**Stoke-on-Trent.** — March 11th. Electricity Department. Twelve months' supply of mains, cables, static transformers, and e.h.p. truck-type switchgear. Also battery for electric vehicle. (See this issue.)

**Uruguay.**—Montevideo.—April 8th. State Electricity Works Administration. Automatic cut-outs. (A. 10777.)*

**Warrington.**—March 9th. Electricity Department. Motors and transformers. (See this issue.)

**Westhoughton.**—February 27th. Urban District Council. Electric lamps for twelve months. Form of tender from Mr. G. Hayes, surveyor, Council Offices.

**Wortley.**—February 27th. Rural District Council. Electrical installation at isolation hospital, Grenoside. Specification from Mr. F. Thurlby, surveyor to R.D.C., Council Offices, Grenoside.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

# Contracts Closed.

**Clacton-on-Sea.**—Urban District Council. Accepted :—
Plant for the Holland Haven pumping station (£930).—Crompton Parkinson, Ltd.

**Dewsbury.**—Town Council. Accepted :—
Cable.—Derby Cables, Ltd.
Electric sign for electricity showrooms.—Permalite Co.

**Douglas (I.O.M.).**—Electricity Committee. Accepted :—
Cables for 12 months.—Siemens Bros. & Co., Ltd.

**East Ham.**—Electricity Committee. Accepted :—
1,500-kW motor convertor (£3,645).—English Electric Co., Ltd.

**Ealing.**—Town Council. Accepted :—
Supply and erection of electrical machinery, including rising main (£595).—Ralph E. Smart & Co.

**London.** — Stoke Newington. — Electricity Committee. Recommended :—
Secondhand meters.—Westminster Electric Supply Corporation, Ltd.

Shoreditch.—Electricity Committee. Recommended :—
Convertor switchgear equipment (£1,033).—General Electric Co., Ltd.
Converting equipment for Hearn Street sub-station (£3,612).—Hewittic Electric Co., Ltd.
London County Council.—Education Committee.—Electrical work at the South-East London Technical Institute, Deptford :—

| | £ |
|---|---|
| **T. Clarke & Co., Ltd.** (Accepted) ... ... | **4,488** |
| Ditto (Alternative) ... ... ... ... ... | 4,900 |
| Alpha Manufacturing & Electrical Co., Ltd. | 4,529 |
| Alex. Hawkins & Sons ... ... ... ... | 4,999 |
| H. J. Cash & Co., Ltd. ... ... ... ... | 5,026 |
| Electrical Installations, Ltd. ... ... ... | 5,051 |
| J. Briggs, Electrical Contractors, Ltd. ... ... | 5,200 |
| Pinching & Walton ... ... ... ... ... | 5,245 |
| A. Dean & Co., Ltd. ... ... ... ... | 5,327 |
| Burdette & Co., Ltd. ... ... ... ... | 5,900 |
| Leonard G. Tate & Co., Ltd. ... ... ... | 6,285 |

Recommended :—
Electric lighting, &c., at Down school, Hackney (£340).—H. J. Cash & Co., Ltd.

**Northern Ireland.**—Ministry of Finance. Accepted :—
Electric lamps for 12 months.—Siemens Electric Lamps and Supplies, Ltd.

**Salford.**—Education Committee. Accepted :—
Electric lighting installation at West Liverpool Street school (£197).—F. Bainbridge.

**Smethwick.**—Watch Committee. Accepted :—
Electrical installation at the new Law Courts, Crocketts Lane.—Walker & Co.

**South Africa.**—Cape Town.—Electricity Committee. Accepted :—
Fifty miles insulated wire.—British General Electric Co., Ltd.
250 fuses (£331).—A. Vaux, Ltd.
Hackbridge transformers, six 500-kVA (£1,812), seven 150-kVA (£1,099).—Hubert Davies & Co., Ltd.
Switchgear for new sub-stations (£2,260).—A. Reyrolle and Co., Ltd.
1,000 cross-arms (£210).—British Insulated Cables (S.A.), Ltd.
Overhead line material.—Davis & Soper, Ltd.; British Insulated Cables (S.A.), Ltd.; Steel Trading Co., Ltd.; Griffin Engineering Co., Ltd.; and Rogers Jenkins and Co., Ltd.

**Walsall.**—Finance Committee. Recommended :—
Electric wiring at municipal offices (£100).—H. Davies and Son.

**Warwick.**—County Council. Accepted :—
Electrical installation at County Hall (£1,628).—Midland Electric Light & Power Co., Ltd.

**York.**—Watch Committee. Accepted :—
Traffic signal alterations (£166).—Barber & Coleman, Ltd.

# Forthcoming Events.

**British Electrical Development Association.**—Friday, February 20th. Royal Society of Arts. 7.30 p.m. Salesmanship Conference. "Electrical Methods—Ventilation and Air Conditioning." Mr. J. I. Bernard.

**Association of Supervising Electrical Engineers.**—Saturday, February 21st. Hotel Great Central. 6.30 for 7 p.m. Annual dinner.

**Finsbury Technical College Old Students' Association.**—Saturday, February 21st. Trocadero Restaurant, London. 6.30 for 7 p.m. Annual dinner.

**Paisley Association of Electrical Engineers.**—Tuesday, February 24th. Y.M.C.A. Board Room, Paisley. 7.30 p.m. "Airbreak Switchgear." Mr. R. W. S. Mackay.

**Electrical Power Engineers' Association (London Local Group).**—Tuesday, February 24th. Junior Institution of Engineers, London. "Grit Catching." Prof. W. E. Gibbs. Saturday, February 28th. Café Royal, Regent Street, W. 7-12 p.m. Annual dinner and dance.

**Royal Society of Arts.**—Wednesday, February 25th. Adelphi, London. 8 p.m. "Developments in Television." Mr. W. G. W. Mitchell.

**Polytechnic, Regent Street, W.1.** Wednesday, February 25th. 7.30 p.m. "Economics of Electricity Supply." Mr. D. J. Bolton.

**Institution of Electrical Engineers.**—Thursday, February 26th. Institution, London. 6 p.m. Faraday lecture. "The Birth of Electrical Engineering." Prof. W. Cramp. **(Sheffield Sub-Centre).**—Friday, February 20th. Royal Victoria Hotel, Sheffield. 7.30 p.m. Annual supper-dance.

**(London Students' Section).**—Friday, February 20th. Institution, London. 6.15 p.m. Informal discussion. "Are the Present Methods of those Interested in the Supply of Current and Apparatus Conducive to the Spread of Domestic Electrification?" Opened by Messrs. V. S. Lake and W. F. J. Walton. Wednesday, February 25th. 2.30 p.m. Visit to the Westinghouse Brake & Saxby Signal Co., King's Cross. 8-12 p.m. Dance at Victoria Halls. Southampton Row, W.C.

**(South Midland Students' Section).**—Saturday, February 21st. Visit to the British Industries Fair, Birmingham.

**(North-Eastern Centre).**—Monday, February 23rd. Armstrong College, Newcastle-upon-Tyne. 7 p.m. "High-Voltage Testing Equipments." Messrs. E. T. Norris and F. W. Taylor. "Dielectric Phenomena at High Voltages." Messrs. B. L. Goodlet, F. S. Edwards, and F. R. Perry.

**(Western Centre).**—Monday, February 23rd. Cory Hall, Cardiff. 7 p.m. Faraday lecture. "The Birth of Electrical Engineering." Prof. W. Cramp.

**(North-Midland Centre).**—Tuesday, February 24th. Hotel Metropole, Leeds. 7 p.m. "Apparatus and Methods for Accurate Maintenance of Large a.c. Energy Meters." Messrs. E. Fawssett and G. E. Moore.

**(North-Western Centre).**—Tuesday, February 24th. Engineers' Club, Manchester. 7 p.m. "High-voltage Testing Equipments." Messrs. E. T. Norris and F. W. Taylor. "Dielectric Phenomena at High Voltages." Messrs. B. L. Goodlet, F. S. Edwards, and F. R. Perry.

**(Scottish Centre).**—Tuesday, February 24th. Institution of Engineers and Shipbuilders in Scotland, Glasgow. 7.30 p.m. "Wireless Telegraphy and the Upper Atmosphere." Prof. G. W. O. Howe.

**(Hampshire Sub-Centre).**—Wednesday, February 25th. South-Western Hotel, Southampton. Conversazione.

**(North-Eastern Students' Section).**—Friday, February 27th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. Students' lecture. "Overhead Line Work—More Especially in Connection with the Grid." Mr. F. J. Baldwin.

**(West Wales (Swansea) Sub-Centre).**—Friday, February 27th. Electricity Offices, Swansea. 6 p.m. "The Medical and Surgical Applications of Electricity." Mr. B. Leggett.

**Bristol Electric Club.**—Friday, February 27th. Crown Rooms, Bristol. 7.15 p.m. Address by Mr. J. W. Beauchamp.

**Birmingham Electric Club.**—Friday, February 27th. Grand Hotel, Birmingham. 7 p.m. "Electricity Supply Metering and Methods of Charging." Mr. W. Lawson.

# The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

Importers of "MASTER HEALTHISER."

SCOTT & NORTHRUP switchboard conductivity indicator.

# Notes.

## The Need for "Outlets."

Mr. G. S. Francis, of the Electrical Development Association, addressed a large gathering of housewives and others in the Aberdeen Corporation Electricity Department showrooms on February 11th on the domestic application of electricity. There were many excellent houses being built to-day, said Mr. Francis, complete with modern conveniences in the way of sanitation, heating, and plumbing, and wired throughout with electric light, but without a single socket anywhere for the many other services electricity could provide. By means of lantern slides the lecturer showed how a house should be wired to increase the ease and efficiency of household work through the installation of electric cookers and refrigerators, electrically heated cisterns for baths, &c.

## French Ampère Society.

Following the celebrations a few years ago of the centenary of the discoveries of Andre-Marie Ampère in connection with electro-magnetism in Paris, Lyons, and the United States, it may be remembered that the house at Poleymieux, near Lyons in which Ampère passed his childhood was subsequently acquired by the French Société des Electriciens. News now reaches us that, with influential patronage, a Société des Amis d'Andre-Marie Ampère has lately been formed at Malakoff, near Paris (14, Avenue Pierre Larousse). Among the objects of the new association are the re-printing of Ampère's journal and letters, the formation of a museum of his original apparatus (or copies) to secure funds from which to make grants to young scientific investigators, and also to furnish the old house at Poleymieux in such a way that it may serve as a home where such research workers may from time to time stay for a few weeks for health-restoring purposes.

## Electric Production of Steel.

Before the Leicester Association of Engineers recently Mr. A. H. Gregory (of Edgar Allen & Co., Ltd.) delivered an informative lantern lecture on "The Manufacture and Metallurgy of Tool Steels," in the course of which he spoke at some length of the great part played by electric furnaces in the production of super-quality high-speed tool steels at the present time. The lecturer explained the workings of different types of arc and other furnaces. The high-frequency induction electric furnace enabled ingots of any desired form to be obtained and the alloy was better mixed and more homogeneous than when other types of furnaces were used. Those furnaces were still the subject of much controversy among steel experts in Sheffield, but, for the work under review, he had no hesitation in saying that they possessed marked advantages which would have far-reaching effects on the production of fine steels.

## Fuel or Flue-gas Treatment.

Some interesting comments on the subject of fuel and smoke cleaning are made by Mr. E. W. L. Nicol, fuel expert of the London Coke Committee, in an article in the *Daily Telegraph*, from which the following notes are extracted.

The problem of eliminating excess sulphur dioxide from power-station flue gases has been energetically tackled by the Fuel Research Board and power supply authorities contemplating the erection of new power stations in populous areas. Success is claimed for large-scale experiments which have been made, and it is hoped that in actual practice the heavy cost of "scrubbers," or flue-gas washing plant, will be justified by the results obtained. The dimensions and cost of a scrubber to treat, at a comparatively high temperature, the voluminous effluent from a modern power station consuming 2,000 tons of coal a day must be left to the imagination, but that the cost would adversely affect the cost per kWh supplied to the consumer, without any appreciable compensating advantage to the individual, must be a foregone conclusion. A study of the exhaustive discussion which the problem has received fails to reveal adequate consideration of the treatment of the raw coal for the removal or neutralisation of the offending impurities, but experience tends to prove that, by so doing, results that are deemed to be satisfactory have been obtained without sacrifice of commercial efficiency. Contained mainly in the form of iron pyrites, largely recoverable by a simple and relatively inexpensive process of crushing and washing, sulphur is usually of the "fixed" and "volatile" descriptions in approximately equal proportions. Treated in this manner, before combustion, the sulphur impurities may be dealt with at the minimum of cost in their most concentrated form, and eliminated or reduced almost to a negligible minimum.

Considered from another angle, the volatile sulphur might be driven off and recovered by the high-temperature process of carbonisation, as profitably carried on at gasworks. The coal so treated at gasworks, in the manufacture of gas and coke, is approximately double the quantity at present used in the raw state in power stations. The h.t. coke produced contains frequently less than 1 per cent. of sulphur, and that only of the "fixed" or non-volatile variety, the volatile sulphur impurity having been eliminated by carbonisation at a temperature of 2,000 deg. F. or more.

The growing use of gas coke for domestic heating purposes renders available increasing quantities of breeze and smalls which might profitably be utilised as fuel.

The sandwich system of fuel blending was designed and used primarily as a means of utilising coke breeze, in conjunction with bituminous coal, with mechanical stokers of the travelling chain-grate type; but the principle of blending coal and coke has more recently been applied, with equal success, to mechanical stokers of the retort, or underfeed, type. Admixtures of non-volatile coke or low-volatile coal, usually considered unsuitable for mechanical stoking, tend to prevent the formation of smoke by reducing the volatile content of the combined fuel as fired; thus a 50 per cent. admixture of coke breeze to bituminous coal containing the average 28 per cent. volatile combustible matter would give a total of only 14 to 16 per cent. volatile, approximately the same proportion contained in Welsh smokeless coal.

Published test results prove that in the matters of thermal efficiency and fuel cost per kWh generated, power stations using a blend of washed coal and coke breeze are quite equal to those of similar output and load factor using coal alone, either pulverised or mechanically fired, and one has recently been described by a medical officer of health as a model of what power stations should be in the matter of boiler effluent

The principle of fuel blending to obtain the desired result at minimum cost has long been recognised in the Portland cement industry. Applied to the gas industry, its advantages in this connection are now also recognised, and blending equipments are in course of development; its further application in the electric power industry warrants the attention of all concerned in the national scheme of electricity supply.

### Electricity for Housewives.

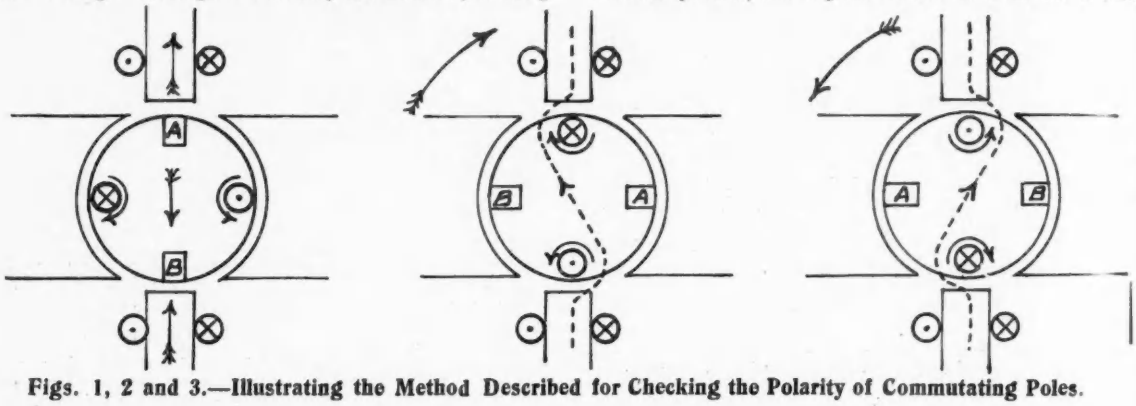
As a means of popularising the use of electricity and of giving consumers hints in its economical use, the York Electricity Committee arranged a series of popular talks by experts, the fourth of which was held recently in the Technical Institute, when the lecturer was Mr. C. F. Partridge, B.Sc., A.M.I.E.E., head of the Electrical Engineering Department of the Leeds Technical College. Mr. Partridge entertained a large audience with an informative talk, phrased in simple language, about the many devices now in use both to lighten labour in the home and to increase cooking efficiency. Councillor C. T. Hutchinson, vice-chairman of the Electricity Committee, who presided, said the York Electricity Department now had 13,000 consumers, an increase of 100 per cent. in five years, and the progress made was being steadily maintained.

### Royal Society of Arts Competition of Industrial Designs.

Particulars of the eighth annual open competition of industrial designs have been issued, and can be obtained from the secretary of the Royal Society of Arts, John Street, Adelphi, London, W.C.2. Intending competitors must apply to the secretary between May 1st and May 9th for the necessary entry forms. In all, scholarships and prizes amounting to about £1,600 are offered, *inter alia*, in the architectural decoration section for a ceiling light for a restaurant and for a kinema, electric light fittings for a lounge; entrance lobby to a bank; suite rooms for a large liner; a fireplace and mantelpiece, and in the advertising section for designs for posters for an electric wiring system.

### The Polarity of Interpoles.

It is often necessary to check the polarity of commutating-pole windings. Although this is easily determined by running the machine on load with the brushes set in the neutral position, when if the polarity is correct commutation will be satisfactory and *vice versa*, it often happens that it is not convenient to load the machine. Again, to check the polarity by means of a compass needle is not always quite so simple as it looks, chiefly owing to the inaccessibility of the poles, especially in small machines. A method submitted to us by a contributor as a ready means of checking the polarity is to run the machine as a series motor, using the interpole winding as the series field. The interpole ampere-turns must be in opposition to those of the armature, so that, if the armature current be assumed to flow outwards on the right and inwards on the left of the armature, the current in the interpole winding must be inwards on the right and outwards on the left, as shown in fig. 1. If the brushes be moved in a clockwise direction through half a pole pitch, the armature conductors will be carrying current in the magnetic field set up by the interpole winding as shown in fig. 2; the resulting torque will be in a clockwise direction, and the machine will therefore run as a series motor with clockwise rotation. If, on the other hand, the brushes be moved half a pole pitch in the counter-clockwise direction, the armature rotation will be counter-clockwise also, fig. 3. It follows, therefore, that the behaviour of the machine under these conditions will be exactly similar to that of the a.c. repulsion motor, in that the direction of rotation is the same as the direction of the brush shift. Needless to say, the machine must not be allowed to reach an excessive speed; a few revolutions is sufficient for the test.




**Figs. 1, 2 and 3.—Illustrating the Method Described for Checking the Polarity of Commutating Poles.**

### The Internal-Combustion Turbine.

It is suggested by Mr. W. E. Warrilow that no finer monument to the life and work of the late Sir Charles Parsons could be raised than the solution of the fascinating problem of making the internal-combustion turbine practicable. Parsons's triumph over enormous difficulties—metallurgical, structural, thermo-dynamical—should provide the stimulus, if such were needed, to attack the obstacles which still stand between experiment and achievement in this field. He writes:—

"The need for this prime mover is abundantly evident throughout the world to-day. Already the piston-type of internal-combustion engine is used in vast numbers for cars, boats, ships, and aeroplanes, a challenge to the efforts of Parsons and his contemporaries. No engineer would agree that such reciprocating machines are the last word in design—greatly as he may be intrigued with the cylinders, carburettors, valves, gears, "swirling" heads, and methods of scavenging, &c., &c., which go to make them up. Whatever its thermal efficiency, any reciprocating engine must remain a mechanical outcast among devices employing direct rotary motion such as turbines and electric motors. Surely the internal-combustion turbine is not given up as hopeless, when we have at our disposal means, materials, and methods which were denied to the pioneers of the steam turbo-generators during the past twenty years; there ought to be found the key to this hitherto unsolved engineering puzzle. Boilermakers may disapprove, but engineering cannot stand still, and the internal-combustion turbine would appear to be the next logical step forward from the steam turbine. To stop at the piston engine in converting the latent energy of oil into mechanical energy would be to leave the unfinished work of Parsons and his associates, and, further, would suggest the bankruptcy of inventiveness among present day engineers."

### Welding Cast Iron.

In a recent paper submitted to the Institution of Welding Engineers, Messrs. H. D. Lloyd and J. S. G. Primrose discussed the use of pure-iron electrodes for welding cast-iron. They admit that the successful welding of cast-iron is not always easy, as much depends upon the skill and experience of the operator, and the type of rod preferred by one will not always suit another. Each individual case of cast-iron repair must be carefully considered in the light of previous experience, and the best method decided upon only after all the aspects of the requirements of the finished weld have been decided. Preheating should be avoided wherever possible, and a great aid to this is the use of pure soft-iron electrodes put on with thin runs. Experienced men can produce excellent results and guarantee an equal satisfaction to the original castings, but until such time as a non-destructive form of test can be applied to every weld, either as a visual X-ray shadowgraph or a magnetic indicator of serious discontinuity, there may always be a small proportion of cases in which disappointment occurs.

### Generation of Electricity.

The official returns rendered to the Electricity Commissioners show that 1,141 million kWh of electricity were generated by authorised undertakers in Great Britain during the month of January, 1931, as compared with the finally revised figure of 1,079 million kWh for the corresponding month of 1930, or an increase of 5.7 per cent.

### Faraday House Old Students' Dance.

The annual supper-dance of the Faraday House O'd Students' Association and Faraday House Rugby Club was held on Friday last at the Hotel Russell, Russell Square, W.C., and over 200 members and friends were present. Early in the evening it became evident that everybody was out for a good time and a "Paul Jones" quickly broke the ice of reserve. Merriment reached its height with the resurrection of some of the dances of the past generation, and considerable amusement was caused by the younger people present in their endeavours to solve the intricacies of the barn dance and polka. Dancing continued until the early morning, and there was no sign of fatigue when we left.

### Large Electrically-operated Floating Crane.

A notable engineering achievement is represented by an electrically-operated floating gate-lifting crane recently built for use at Port Weller, the Lake Ontario entrance to the Welland Canal. This crane is capable of lifting vertically 500 tons, and has been constructed for use in case of emergency to lift the huge canal lock gates, including those at Thorold, each leaf of which weighs 500 tons. Some idea of the power of the crane may be had from the fact that 1,000 tons of permanent ballast is used to counterbalance the weight of

the crane tower and its load, in addition to a shifting ballast of water, which may be moved from tank to tank among eight separate tanks. The head of the tower, 110 ft. above the bottom of the vessel, weighs 28 tons, while each of the steel towers on which it rests weighs 18 tons. The vessel supporting the crane is 90 ft. in length, with a beam of 66 ft. In addition to the 500-ton vertical hoist the gate lifter is provided with a utility boom which can be swung like that of an ordinary crane and is capable of lifting 125 tons.

### Appointments Vacant.

Three district electrical engineers and one chief clerk for Dumfries County Council.

Borough electrical engineer for Nelson Town Council.

Assistant in constructional department for Hull Electricity Department.

(See our advertisement pages to-day.)

### E.P.E.A. Dinner.

The improvement in the status of electrical power engineers was the theme which ran through the speeches at the annual dinner of the Portsmouth Area Section of the Electrical Power Engineers' Association held on February 7th. Mr. A. Goodall, Eastbourne, president of the South Coast Section, was in the chair.

Proposing the toast of the Association, Mr. B. Handley, engineer and manager, Portsmouth electricity undertaking, remarked that it had done much for the power engineers. Conditions in the old days, he said, were very unsatisfactory, and every credit was due to the Association for the way in which it had got on with the business of obtaining better conditions.

Mr. A. V. Sendall, president, declared that the Association had been the making of the power engineer—it had increased his efficiency and the efficiency of the industry. After a twelve months' tour of Great Britain, he could say that the status of the power engineer to-day was higher than it had ever been before. They were now faced with changed conditions in the industry owing to the operation of the national scheme, but it was for the power engineers to do their utmost to bring that scheme to a successful issue. If they did that in the same way as they had worked in the industry already, they would receive that co-operation from and recognition by the Central Electricity Board which would do what was essential to keep unemployment in the industry at its present low figure.

Proposing the toast of the Portsmouth Electricity Committee, Mr. A. G. Hiscock stated that Portsmouth had always honoured the schedule, and the chairman of the Committee, Alderman A. Hemingway, in reply, spoke of the progress that had been made.

The ladies received a special welcome from the chairman, and after the dinner there was a dance, for which Mr. P. A. Weir acted as M.C.

### Cost of Electricity in the Country.

As we went to press we received the following letter from Mr. L. L. Robinson:—

"We are beginning to get a chance of comparing promises with facts. The 'grid' and supplies over large areas were to give us cheap and abundant supplies all over the country. At Burnham-on-Crouch, Essex, the County of London Electric Supply Co. are about to commence a supply.

"The choice of tariff is 8d. per unit flat rate, which I do not complain of, and a two-part tariff based on size of house with a stiff primary charge and 1½d. per unit. Where are those ½d. units we were promised, and what is the good of 1½d. units for an all-electric house? None but a fool or millionaire would heat and cook in a wholesale manner at 1½d. per unit. Surely it is time that maximum allowable prices should be fixed by the Ministry, not only for the flat rate, which really does not matter much, but more especially for the fixed charge, and more especially still the unit charge in two-part tariffs.

"While the company adheres to such a prohibitive scale of charges, my good old 'Petter' will continue in operation, because it appears my 2-kW station on the spot beats Barking far off. On the score of reliability, Burnham-on-Crouch has to rely upon miles of single overhead and underground feeder. I wonder what the reliability factor will be. Again I feel safer with 'Petter and Battery.'"

### Fatality.

An inquiry was held at Dumfries on February 12th into the circumstances attending the death of Robert Hyslop, miner, of Kirkconnel. It appeared from the evidence that deceased was engaged in drilling holes in the coal face in the Knowe Dook of No. 3 Pit, Fauldhead Colliery, with a portable electric drilling machine. A workmate said that after he had bored between sixty and seventy holes Hyslop dropped the machine and sat down, and said to his mate "That was a hard one." In about a minute the deceased became unconscious and although several workmen tried artificial respiration for about three hours, the man never regained consciousness. Evidence was given which indicated that there was a small hole in the cable near the place where it was connected to the machine. Inspection had shown that strands of the inner wire of the cable had broken, and it was possible that these might have punctured the outer casing. The machine in question had been in use since October, 1930, and during that time had been inspected seven times. The jury's verdict was that deceased received an electric shock and that death was due to heart failure.

### Institution of Electrical Engineers.

INFORMAL MEETING.—At the informal meeting of the Institution on February 9th Dr. A. Rosen was in the chair, when a discussion on "The Maintenance of Supply to Consumers in Rural Areas" was opened by Mr. R. W. L. Phillips. It was usually declared that rural districts could not profitably be electrified. He, however, felt this pessimistic attitude had to stop. Electricity had become a topic with the countryman; frequently he might be overheard to say "When's this 'ere electricity coming along." Service was the whole secret of success. While it was very desirable to get the cheapest possible layout, it was essential to pay every regard to reliability of service, for once the novelty of the supply had worn off, any breakdown would be strongly resented. Mr. Phillips' problem was how to deal with sporadic faults on an attenuated system without overloading the scheme with maintenance engineers. A man on a motor-cycle on a wet day was not welcomed when he called at a house to effect a small repair, so he had found a light box-van best, but a van could not be sent on a long journey for a minor fault, and this was the crux of the whole problem. He felt the supply authority must be the maintenance agent, but it must not be forgotten that many consumers contributed only about 30s. a year for supply.

Dr. A. Rosen suggested that the supply authority might have a panel of approved manufacturers of apparatus; members on the panel could contribute to a fund to provide a maintenance service, and it might be combined with the meter reading duty.

Mr. R. Grierson said that maintenance was a charge on the industry, but asked which section of the industry was to provide the service. Reliability would eventually devolve upon a proving house. He believed they were only on the fringe of the demand for electricity, and ideas of energy consumption were going to enlarge to an extraordinary extent.

Mr. Walter Riggs said that at last supply engineers were in touch with a problem that contractors had been up against all along, but contractors had now evolved a system of insurance by which installations were periodically inspected and maintained for a very small fee.

Mr. Phillips believed the solution would be inspection, and it would show that prevention was cheaper than cure.

NORTH-MIDLAND STUDENTS' SECTION.—At a meeting held on February 17th, Mr. H. C. Bowker read a paper entitled "Characterisation of the Spark," in which he dealt with the relation of the spark to other electrical discharges and experimental work to investigate the effect of high temperature on spark potential.

# Our Personal Column.

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.**

**Mr. S. H. Pook**, who was a partner with Mr. W. W. Cook in the firm of "Cook & Partners," which was dissolved in October, 1929, has resigned from the service of the International Telephone & Telegraph Corporation. He is resuming work as a telephone consultant.

Mr. **Clifford Beck** has been appointed sales engineer to the Scarborough Corporation Electricity Department.

Mr. **H. G. Massingham**, a pioneer of electricity supply in this country, celebrated his 80th birthday on Monday last.

The Sydney Press reports that **Mr. R. M. Hatfield**, who has been managing director of the Western Electric Co. in Australia and New Zealand for the past two years, recently left Australia for London. Mr. Hatfield has been appointed managing director of the company in Europe and Great Britain. His successor in Australia is **Mr. J. H. Barker**, junr., formerly in charge of the company's affairs in New Zealand.

**Dr. Frank Conrad**, assistant chief engineer of the Westinghouse Electric & Manufacturing Co., has been awarded the 1931 Edison Medal by the American Institute of Electrical Engineers.

We are glad to learn from **Mr. F. C. Raphael** that he has now completely recovered from his recent serious operation.

We reported in our issue of January 8th that **Mr. E. E. Sharp**, of Venner Time Switches, Ltd., was visiting the United States. We now hear that he has made an arrangement on behalf of his company with the Sangamo Electric Co., of Springfield, Ill., and its associated Canadian company for co-operating with them in the manufacture of time switches.

**Mr. B. Quarmby,** lately service manager at the Manchester branch of Frigidaire, Ltd., has joined Leda Electric, Ltd., Miles Platting, Manchester, manufacturers of domestic refrigerators, &c.

We reproduce herewith a recent portrait of **Mr. Charles H. Merz,** who, as we reported in our last issue, has been awarded the Faraday Medal by the Council of the I.E.E. Mr. Merz is senior partner in the firm of Merz and McLellan, the prominent consulting engineers, and in that capacity has been responsible for the execution of many notable electrical undertakings, among which the Barking and North Tees stations may be mentioned. He has acted as consultant for many Government and other public bodies, both at home and abroad, including the Central Electricity Board, the Newcastle-upon-Tyne Electric Supply Co., Ltd., and its associated companies, the County of London Electric Supply Co., Ltd., and the Commonwealth Edison Company, of Chicago. He has also been closely associated with the efforts made since 1905 to co-ordinate the supply of electricity in London. He has also a number of important railway electrification schemes to his credit, including the conversion of the South African Railways and the Great Indian Peninsula Railway. Mr. Merz has served on a number of Government Committees dealing with electricity supply, mines, and national reconstruction, among which were the Haldane and Williamson Committees which in 1917 and 1918 laid down the general principles upon which present developments in electric power supply are based. He was a vice-president of the I.E.E. from 1912 to 1915, and has read several papers before the Institution, the British Association, and other important scientific bodies.

*L. N. A.*] [*London.*

**Mr. Charles H. Merz.**

Who has been awarded the Faraday Medal.

Twelve applications have been received for the position of tramway manager and engineer in Belfast, in succession to **Mr. W. Chamberlain,** who has been appointed a Traffic Commissioner. The Tramway Committee has fixed the salary for the position at a sum not exceeding £1,750 per annum, which is considered adequate remuneration for the office. Mr. Chamberlain's salary was £2,250 per annum.

**Mr. E. W. Harmer,** A.M.I.E.E., A.M.I.E. (Australia), after spending over three years in Australia as chief illuminating engineer and manager of the fixtures department of the Sydney branch of the General Electric Co., Ltd., has returned to England to take up lighting work in this country. His address is South Bank House, Surbiton, Surrey.

**Mr. R. Lomax** has been appointed electricity manager by the Hazel Grove and Bramhall Urban District Council at a salary of £600 per annum.

The Woolwich Borough Council has been recommended to grant superannuation to **Mr. G. W. Keats,** the borough electrical engineer of Woolwich, on the ground of ill-health, after 31 years' service. **Mr. F. F. Elliott,** the station engineer, has been appointed to fill the vacancy. The salary of **Mr. S. H. Penning,** the deputy borough electrical engineer, has been increased to £1,100 a year.

**Mr. E. A. Boxall,** having resigned his position as South Coast representative for Messrs. Baxter & Caunter, Ltd., has joined the Maybrook Electrical Co., Ltd., as their representative for the Southern Counties.

# Obituary.

**Sir Charles Parsons.**—It is with very deep regret that we record the death on February 11th of the Hon. Sir Charles Algernon Parsons, O.M., K.C.B., F.R.S., while on a cruise to the West Indies.

Sir Charles, the fourth son of the third Earl of Rosse, was born on July 13th, 1854. He was privately educated, subsequently going to St. John's, Cambridge (of which he later became an Honorary Fellow), and at the age of 22 he was placed as eleventh wrangler in the Mathematical Tripos. His engineering apprenticeship was served at Armstrong's Elswick works, where he soon showed an example of his inventive genius in the design of a 4-cylinder rotary engine, which he afterwards developed when he joined Kitson's at Leeds. He returned to Tyneside in 1883 as a partner in the firm of Clarke, Chapman & Co., and a year later built his first compound turbo-dynamo, which was rated at 10 h.p. and ran at 18,000 r.p.m.; the diameter of the armature was 3 in. In 1897 he established the works at Heaton, where turbines and electrical plant have ever since been manufactured in steadily increasing sizes for both home and export; the most striking examples of the latter were the two generating sets sent to Chicago, one of 25,000 kW in 1913 and one of 50,000 kW in 1925. To electrical engineers the salient point in Parsons's work was his application of the steam turbine to the generation of electricity on the large scale which forms the basis of present-day practice. Right up to the end he was, moreover, actively engaged in investigations with a view to securing even greater utility from his invention mainly in the directions of higher steam pressures and temperatures. As examples of his continual interest in developing the possibilities of the turbine may be cited his papers before the British Association in 1929 and the Second World Power Conference last summer; the construction of a 33-kV alternator for Brimsdown power station less than three years ago also provides an illustration of the same mental activity with the same end in view. Important as was his work in connection with electricity supply, Parsons's public reputation rests even more upon the change brought about in marine propulsion through the introduction of the turbine, his reconciliation (in 1910) of high prime-mover speed with low-propeller speed, and, more recently, the additional efficiency achieved through the use of higher steam pressures. The construction of the first turbine propelled vessel, the *Turbinia,* in 1897 (which after modification achieved the then extraordinary speed of over 34 knots), began a new epoch.

*Russell*] [*London.*

**The late Sir Charles Parsons, O.M., K.C.B., F.R.S.**

Then followed the Admiralty orders for the destroyers *Viper* and *Cobra,* and in 1905 the supremacy of the turbine was assured by the decision to use this method for the propulsion of the *Dreadnought.* A similar decision was made in 1907 by the owners of the *Mauretania* and *Lusitania.* A further step was taken in 1926, when the turbines for the passenger steamer *King George V* were designed for a steam pressure of 550 lb. per sq. in., and by this means achieved an economy of 30 per cent. over similar vessels operating with lower steam pressures.

Contemporary recognition of Parsons's genius was shown in the award of the Order of Merit (1927), K.C.B. (1911), the Rumford and Copley Medals of the Royal Society, of which he was elected a Fellow in 1898, and the Kelvin Medal. The Institution of Electrical Engineers, of which he had been a member since 1888 and also a vice-president, made him its

highest award, the Faraday Medal, in 1923. He was a past-president of the British Association, the Institute of Physics, and other technical and scientific bodies, and was an original member of the Advisory Council of the Department of Scientific and Industrial Research. His contributions both in personal service and in gifts to scientific institutions were on a generous scale.

He was chairman of C. A. Parsons & Co., Ltd., the Parsons Marine Steam Turbine Co., Ltd., Parsons Optical Glass Co., Ltd., and of Ross & Co., Ltd. (optical works), the last two indicating another field of his activities, an interest and skill in which he may be said to have inherited from his brilliant father.

Lady Parsons, who survives him, shared his interests and was a founder of the Women's Engineering Society. They had two children: a son who was killed in the war in 1918, and a daughter, who inherits an aptitude for mechanics and has been trained as an engineer.

A memorial service will be held at Westminster Abbey on March 3rd at 2 p.m. Seats will be reserved in the stalls and choir for relatives and heads of learned societies, by whom tickets may be obtained from Mr. A. D. C. Parsons, 56, Victoria Street, S.W.1. The lantern will be reserved for others presenting their cards.

A memorial service will also be held at St. Nicholas Cathedral, Newcastle-on-Tyne, on March 3rd at 2 p.m.

**Sir Arthur Dorman.**—On the following day (Thursday last week) the death occurred of another great industrial leader—Sir Arthur Dorman, Bt. Sir Arthur, who was born in 1848, entered the iron industry as an apprentice at the age of 18 and ten years later founded the firm of Dorman, Long & Co. in association with the late Mr. A. de L. Long. The company grew rapidly and absorbed several other iron and steel works, until in 1929 a merger took place with Bolckow, Vaughan Co., Ltd., resulting in the establishment of a concern with over £17,000,000 capital. Sir Arthur's eldest son died three years ago; he is succeeded by his second son, Mr. Bedford L. Dorman. Mr. Arthur Dorman his third son is managing director of Dorman, Long & Co. The funeral took place at Nunthorpe Church, Yorks., on Saturday last.

**Mr. A. E. Bannister.**—We regret to hear of the death of Mr. A. E. Bannister, senior representative in Leeds, of Messrs. Falk, Stadelmann & Co., Ltd. Mr. Bannister had been connected with the company for seventeen years, and was senior electrical representative in the Manchester area prior to the opening of the Leeds branch in 1930. Mr. Bannister successfully underwent an operation last month, but bronchitis and pneumonia developed, and he passed away on February 11th. The funeral took place last Monday at Leeds.

**Mr. V. Dempsey.**—The death recently occurred of Mr. V. Dempsey, electrical engineer at Bray (Co. Wicklow) for the Irish Electricity Supply Board. Mr. Dempsey was formerly assistant electrical engineer to the Bray Urban Council.

**Alderman Herbert Bown.**—The death is announced, at the age of 59 years, of Alderman Herbert Bown, J.P., head of the firm of Messrs. J. Bown & Co., boilermakers, &c., who in late years have extended their interests to the electrical trade.

**Signor P. Lanino.**—The death is reported from Milan, at the age of 60 years, of Signor P. Lanino, the chief engineer of the Italian State Railways and a pioneer of main-line electric traction in that country.

**Sir L. Worthington-Evans.**—The Rt. Hon. Sir Laming Worthington-Evans, Bt., M.P., who died on Saturday last at the age of 62, was, among his other activities, a director of the Greater London and Counties Trust, Ltd.

---

**Wills.**—**Mr. Joseph P. Sykes,** the late managing director of the W. R. Sykes Interlocking Signal Co., Ltd., left £2,427 (£195 net personalty).

The late **Mr. Thomas Armitage,** director of the Century Electric Co., Ltd., Manchester, left estate valued at £7,357 gross (£3,556 net personalty).

The late **Mr. Thomas A. Clack,** who was formerly with the Telegraph Construction & Maintenance Co., Ltd., left £3,306 (net personalty £3,223).

# Financial Section.

**New Companies Returns of Share Capital, Debenture Charges, Reports of Electrical Companies Dividend Changes, Transactions in Stocks and Shares.**

## New Companies Registered.

**G. W. B. Electric Furnaces, Ltd.**—Private company. Registered February 12th. Capital, £10,000 in £1 shares. Objects: To adopt an agreement with Gibbons Brothers, Ltd., and Wild-Barfield Electric Furnaces, Ltd., and to carry on the business of manufacturers of and dealers in furnaces, kilns, plant and materials for the treatment of metals, potterv, hardware and other materials, &c. The directors are: T. Allen, address not stated; E. P. Barfield, Porlock, Athenæum Road, Whetstone, N.20; M. van Marle, address not stated; A. E. Barfield, address not stated; W. Gibbons, Holbeach Croft, Kingswinford, near Dudley (director Gibbons Brothers, Ltd); J. E. Oram, address not stated. Registered office: Elecfurn Works, North Road, Holloway.

**Boxer Radio Co., Ltd.**—Private company. Registered February 7th. Capital, £250 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in goods in connection with wireless telegraphy and telephony, &c. The subscribers are: E. V. Boxer and A. E. Boxer, 12, Ferry Road, Barnes. Registered office: 8, Seymour Place, W.1.

**Y.E.C. & I.D., Ltd.**—Private company. Registered February 11th. Capital, £1,000 in 1,000 10 per cent. cumulative preference shares of 10s. and 10,000 ordinary shares of 1s. each. Objects: To carry on the business of electricians, mechanical engineers and manufacturers, workers of and dealers in electricity, &c. The subscribers are: H. L. Delow and H. J. Paddick, 61, Cheapside, E.C.2, solicitor's clerks. Solicitors: Wingfields, Halse & Trustram, 61, Cheapside, E.C.

**Radio Research, Ltd.**—Private company. Registered February 11th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers, maintainers, repairers, importers and exporters of and dealers in all wireless telegraphic, telephonic, television and talking picture apparatus, &c. The directors are: E. W. Harris, 16, Chevening Road, N.W.6; E. J. Reid (managing director), 120, Mill Lane, N.W.6; A. Wolmark, 47, Broadhurst Gardens, N.W.6. Registered office: 3, Blackburn Road, West Hampstead, N.W.6.

**Atkinson & Smith, Ltd.**—Private company. Registered February 10th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical, sanitary, gas and heating engineers, wireless experts, &c. The directors are: J. Smith, 271, Bradford Row, Riddlesden, Keighley; Mrs. B. Smith, 95, Aireville Road, Frizinghall, Bradford. Registered office: 4, Lynthorne Road, Frizinghall, Bradford.

**Rayette Rapid, Ltd.**—Private company. Registered February 13th. Capital, £1,000 in £1 shares. Objects: To adopt an agreement with L. S. Weisman relating (*inter alia*) to the acquisition of the trade mark "Rayette" Nos. 515277 and 516446, and to carry on the business of wireless dealers and battery manufacturers as formerly carried on by him at 128, King Street, Hammersmith, W. The directors are: L. S. Weisman and Mrs. Ray Weisman, 128, King Street, Hammersmith, W. Secretary: L. S. Weisman. Registered office: 128, King Street, Hammersmith, W.

## Official Returns of Electrical Companies.

**Super Radio (Lancs.), Ltd.**—Debenture dated January 30th, 1931, to secure £3,000 charged on the company's property, present and future, including uncalled capital. Holders: Mrs. F. R. Freeman, 24, Ullet Road, Liverpool, and another.

**South African Lighting Association, Ltd.**—Satisfaction in full on January 1st, 1931, of a series of debentures authorised by resolution dated September 29th, 1920, and registered February 14th, 1921. (According to the register of mortgages, the series of debentures registered February 14th, 1921, originally secured £25,000.)

Issue on February 21st, 1921, of £4,140 debentures part of a series already registered. (Notice filed February 9th, 1931.)

**South Metropolitan Electric Light and Power Co., Ltd.**—Satisfaction in full on December 31st, 1930, of second mortgage debenture for £50,000, dated July 18th, 1917, and registered July 19th, 1917.

**Kensal Radio Manufacturing Co., Ltd.**—H. F. Smith, 12, Old Compton Street, W.1, was appointed receiver and manager on February 7th, 1931, under powers contained in debenture dated January 14th, 1931.

**Flather & Co., Ltd.**—Capital, £20,000 in £1 shares. Return dated December 4th, 1930. 13,208 shares taken up. £11,708 paid. £1,500 considered as paid. Mortgages and charges, nil.

**Southern Brazil Electric Co., Ltd.**—Capital, £507,800 in 650,000 ordinary shares of 10s. and 182,800 10 per cent. cumulative preference shares of £1 each. Return dated December 24th, 1930. All shares taken up. £3 10s. paid on 7 ordinary shares. £507,796 10s. considered as paid on the remainder. Mortgages and charges: £804,470.

**Newey & Eyre, Ltd.**—Capital, £4,000 in £1 shares. Return dated September 30th, 1930. 1,002 shares taken up. £1,002 paid. Mortgages and charges at date of return, nil. Since registered: Debenture dated November 10th, 1930, to secure £2,245.

**Wholesale Electrical Supplies (Salford), Ltd.**—Capital, £1,000 in £1 shares. Return dated November 24th, 1930. 500 shares taken up. £500 paid. Mortgages and charges, nil.

**H. Stanley, Ltd.**—Particulars filed of £150 debentures authorised February 3rd, 1931, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

**Peacehaven Electric Light and Power Co., Ltd.**—Particulars filed of £20,000 debentures authorised October 23rd, 1930, charged on the company's undertaking, property and assets, including uncalled capital, the amount of the present issue being £7,500 (on February 2nd, 1931).

# City Notes.

## Yorkshire Electric Power Co.

This company's report for 1930 was summarised in our issue of February 6th (p. 248). The annual meeting was held in Leeds on Tuesday last. Mr. G. H. Peake (chairman), who presided, stated that Mr. W. B. Jones had been appointed a director in the place of the late chairman, Mr. A. G. Lupton, while Messrs. R. Armitage and R. G. Ellis had been appointed joint deputy chairmen. Referring to the state of industry, the speaker said that although the company had endeavoured to assist manufacturers by reducing its charges, the reduction had been largely offiset by increases in national and local taxation. Nearly the whole of the £17,379 increase in the company's receipts had been absorbed by additional rates and taxes. In 1930 the amount paid by the company in rates, taxes, licences and State insurance was £105,977, equal to over 15 per cent. of the total revenue. Electricity undertakings were inequitably treated by their exclusion from the abatement granted by the 1928 De-Rating Act. It was hoped that the Government would make some response to the appeal of the industry for readjustment of local taxation. The demand for electricity for domestic uses continued to grow and collieries had made greater use of electricity; but the textile trades had not done so well. Mr. Peake pointed out that the collieries would do well to consider the superior merits of electricity which were particularly prominent when trade was irregular as electrical plant did not involve continued cost and attention when the pits were not working. One of the most important of the newer uses of electricity was for metallurgical furnaces. A number of these had been connected to the company's mains during the past year. While the company's business in industrial areas had grown, extensions had also been made to rural districts. Experiments in the electrical heating of soil had given encouraging results and the company's engineers were taking an active interest in this and other developments. It seemed likely that the Central Electricity Board would commence the supply of electricity this year. The Ferrybridge station was now regularly supplying a large part of the company's load at a very low cost. The Thornhill station was being extended by the installation of higher pressure boilers and a 30,000-kW turbine. The original generating plant had been written off and removed. When the extensions were completed the company's three stations would contain plant of a total capacity of 119,000 kW. The transmission system had been proceeded with in advance of requirements, but the undertaking was now established on such a scale that future developments could be made by a relatively smaller expenditure. Through the agency of the company's system 200 towns and villages were being supplied with electricity; it was now supplying, directly or indirectly, about 100,000 consumers. Notwithstanding the state of trade, the company's output had increased by 71 per cent. during the last five years and continued progress was assured by the advantages of the use of electricity and the new applications which were being made. As the company's distribution system in the industrial area of the West Riding was capable of supplying much greater needs than existed at present, any revival of trade, or increase in the use of electricity, would tend to reduce the cost of supply. The company's work had resulted in the elimination of a number of small and inefficient stations, and it was hoped that the close co-operation which existed between the company and the local authorities in its area would lead to a further strengthening of the electricity supply organisation.

## The "Underground" Group.

The companies forming the London Underground ("Common Fund") group have declared dividends as follows:—

*Central London Railway Co.*—Final dividend of 2½ per cent. on the undivided ordinary stock, making 5 per cent. for the year (as for 1929); final dividend of 2 per cent. on the preferred ordinary stock, making 4 per cent. for the year (as for 1929); dividend of 6 per cent. on the deferred ordinary stock (same). The reserve receives £38,000 (against £33,000), and the carry forward is £112,062.

*London Electric Railway Co.*—Final dividend of 2½ per cent. on the consolidated ordinary stock, making 5 per cent. for the year, as for 1929; £187,000 to reserve and £198,945 carried forward.

*Metropolitan District Railway Co.*—Final dividend of 2½ per cent. on the ordinary stock, making 5 per cent. for the year (1929 the same). The contribution to reserve is £118,000, and £52,326 is carried forward.

*City and South London Railway Co.*—Final dividend of 2½ per cent. on the consolidated ordinary stock, making 5 per cent. for the year, as for 1929. Reserve receives £30,000, and the carry-forward is £39,637.

*London and Suburban Traction Co.*—No dividend is recommended on the 5 per cent. cumulative preference shares; £57,506 is carried forward.

*Underground Electric Railways Co. of London.*—Final dividend of 5 per cent., making 8 per cent. for the year (same). The special reserve for equalisation of interest on the income debenture stock and income bonds (£86,242), being no longer required, has been transferred to the profit and loss account, increasing the sum carried forward to £352,977.

## Metropolitan Railway Co.

The report for the past year, which was to be presented at the annual meeting yesterday (Thursday), records a net revenue of £827,998 (against £844,515). A final dividend of £2 5s. per cent. is declared on the ordinary stock, making £3 10s. per cent. for the year, against £4 per cent. for 1929. Nothing is placed to reserve (£10,000 last year), a balance of £33,546 being carried forward. The dividend on the surplus lands stock is raised from £3 17s. 6d. to £4 per cent. for the year. The short-distance passenger traffic decreased but the expansion of traffic to and from the outer suburban areas increased. Among the works completed or put in hand during the year were the automatic signalling of the line between Rayners Lane and Uxbridge, and the installation of six new high-pressure boilers to replace part of the existing plant at the Neasden power station. A contract has been let for the construction of a new line between Wembley and Stanmore, and an order has been placed for additional rolling stock. The report refers to the death of the general manager, Mr. R. H. Selbie, C.B.E., and mentions that the Earl of Cromer has been appointed to the vacancy on the Board.

## North Metropolitan Electric Power Supply Co.

The directors' report for the year ended December 31st, 1930, shows a net revenue of £480,172, as compared with £469,225 in 1929. A balance of £28,146 brought forward is added, making £508,318. After providing for debenture charges and preference dividends, and transferring £160,000 (against £126,548) to reserve, there remains a balance of £197,415. From this an ordinary dividend of 10 per cent. is recommended (4 per cent. already paid), leaving £37,415 to be carried forward. The dividend for 1929 was at the same rate. During the year £559,268 was spent on capital account; about 170 miles of underground and 18 miles of overhead trunk and distributing mains were installed; 54 sub-stations were put into service; the amount of energy sold rose by 14¼ per cent. to 228,600,000 kWh; and the number of consumers increased by 18 per cent. to 138,600. Reductions were made in charges in certain districts, and meter rentals and minimum charges were abolished in all districts. Notice has been received from the Edmonton Urban District Council of its intention to exercise its right to purchase the undertaking in its district. Last March an issue of £750,000 of 5½ per cent. debenture stock was made at par to repay a bank loan, &c. The report makes mention of the extension of the capacity of the Brimsdown station to 100,000 kW, and of the death of Mr. E. Garcke, a director of the company. Mr. Garcke's place on the board has been taken by Sir Ernest Clark. Meeting: February 24th.

## Power Securities Corporation, Ltd.

Presiding at the annual meeting on February 16th, the chairman (Mr. G. Balfour, M.P.) said that he was glad to be able to report progress in all directions in spite of the difficulties under which all business had been conducted for some years past. In reviewing the present situation, Mr. Balfour said that future prosperity depended upon the efforts of individuals and not of States. The less Government interference there was the better it would be. Turning to the company's own affairs, he said that the work at Lochaber had been completed during the past year, and was now in successful operation. A further contract for the same clients was being undertaken, involving the construction of two dams, three miles of tunnel, &c., at a cost of £1,200,000. The Grampian scheme had also been completed and put into operation, and a contract for the second

development of the Grampian Company had been commenced. The company also had works in progress in India, Africa, Italy, and other countries; the aggregate value of unexecuted orders in hand was about £4,500,000. The chairman then reviewed the accounts, a summary of which appeared in our last issue. The report and accounts were adopted, and the appointment of Mr. W. C. Lusk as a director, in the place of Mr. H. C. Levis, was confirmed.

### Westminster Electric Supply Corporation, Ltd.

The report for the year ended December 31st last shows a total revenue of £703,905, as compared with £650,192 in the preceding year, and a net profit of £175,964 (£161,292), to which is added £25,574 brought in, making £201,538 available. The preference dividend and standard ordinary dividend (1s. 9.12d. per share) are paid, £36,280 is transferred to special reserve, and £29,683 is carried forward. The electrical energy sold during the year increased by 8,849,936 kWh to 80,286,409 kWh. Meeting: February 24th.

### St. James' and Pall Mall Electric Light Co., Ltd.

The accounts for 1930 show a net profit of £66,491, as compared with £75,339 in 1929, to which is added £100,462 brought forward, making £166,953 available. The standard ordinary dividend (1s. 6.949d.) is paid, special reserve receives £26,280, and £5,507 is appropriated to co-partners, leaving £75,266 to be carried forward. The sales of electricity increased from 37,543,422 to 39,532,205 kWh, and the connected load from 38,609 to 41,637 kW. Meeting: February 24th.

### Chiswick Electricity Supply Corporation.

The directors have announced a final dividend of 6 per cent. on the ordinary shares, making 12 per cent. for the year (against 16 per cent. in 1929). It is stated that when the reduced interim dividend was declared an Order had been made by the Minister of Transport reducing the maximum charge for electricity at Chiswick, and the lower distribution was therefore considered prudent pending the full year's results being available.

### Mather & Platt, Ltd.

The report for 1930 shows a net profit of £132,946, as compared with £269,308 in the preceding year, to which is added £109,855 brought in, making £242,800 available. Tax reserve receives £30,682, and, as reported in our last issue, the ordinary dividend is 10 per cent., as against 10 per cent., plus a bonus of 5 per cent. in the previous year, £55,752 being carried forward.

### Allgemeine Elektricitäts Gesellschaft.

The report of the directors for the year ended September 30th, 1930, states that the general world economic crisis spread to Germany, and the company's business was affected, the total turnover in the year having diminished by about 10 per cent. to 520,000,000 marks. At the beginning of the year the company had a considerable stock of orders, which were completed in the course of the year, but from the middle of the year the orders booked declined in an increased measure. Both public authorities and private customers restricted their orders for financial reasons, and because of the worsening of the economic situation. The directors made efforts to find compensation in larger sales abroad and, as compared with 1928-29, the export deliveries were increased by about 8 per cent., and the stock of orders has fallen off less than that for the inland market. The directors have made special endeavours to reduce working expenses and, by reducing prices, strengthen the company's competitive capacity and increase its turnover. They have been handicapped, however, by the continuation of high taxation in spite of the reduction in business. Moreover, the average wages rates for workmen rose by 2.5 per cent. in 1929-30, and the average for the employés by 7.3 per cent. These circumstances had the effect of considerably reducing the net profits.

Among the orders booked and mentioned in the technical part of the report are those for three 22,500-kW steam turbo sets for the Magdeburg company, two 24,000-kW steam turbo sets for the Russian works in Nigres, a 47,000-kW steam turbo set for the Markisch works, and two 40,000-kVA generators for driving by water turbines for the Société des Forces Motrices de la Truyère. The report states that orders for the railway department were extremely limited. During the year this department completed three mountain railways, the Zugspitzbahn of the Bavarian company in Garmisch, and two lines in Costa Rica and Guatemala, respectively. In the case of the coal-mining industry, it is stated that, besides the provision of electric pumping plant, the company was well occupied with deliveries of winding engines, while at the same time a good deal of driving equipment was delivered to the iron and steel industry for reversing and continuous rolling trains.

The accounts show net profits of 14.231,227 marks for 1929-30, and the dividend is at the rate of 7 per cent., as compared with 9 per cent. in the preceding year.

### German Loan in America.

The Berlin correspondent of the *Financial Times* reports that the Rheinische-Westfälische Elektrizitäts-Gesellschaft A.G. ("R.W.E.") has concluded an arrangement for a five-year credit of $7,500,000 with the National City Co. of New York. The rate of interest is stated to be 7 per cent.

### Atlas Electric & General Trust, Ltd.

An interim dividend has been declared on the ordinary shares of 2 per cent., less tax, in respect of the year ending March 31st next.

### Cables & Wireless, Ltd.

The directors announce the forthcoming payment of the dividend on the 5½ per cent. cumulative preference stock for the half-year ended December 31st last.

### Isle of Thanet Electric Supply Co., Ltd.

A dividend is announced of 4 per cent. on the ordinary shares (same) for the year ended December 31st last. General reserve and depreciation again take £30,000.

### Shawinigan Water & Power Co.

The directors have declared a dividend of $0.63 on the common shares for the quarter ending March 31st.

### London Electric Supply Corporation, Ltd.

The directors have declared a final dividend of 5 per cent. on the ordinary shares, making 9 per cent. for the year.

### Midland Electric Manufacturing Co., Ltd.

A dividend is announced of 10 per cent., plus bonus of 12½ per cent. for the year (same).

### Swedish Company.

The *Allmänna Svenska Elektriska Aktiebolaget* reports a net pro tfiof kr. 5,370,000 for 1930, compared with kr. 4,950,000 for 1929, and the board proposes to pay an unchanged dividend of 7 per cent.—*Reuter's Trade Service* (Stockholm).

### Dutch Company.

The report of the *N. V. Pope's Metaaldraadlampenfabriek*, Venlo, states that despite the economic depression it was possible for the company to maintain the level of sales during the year ended June 30th, 1930. The accounts show net profits of 442,000 fl., against 297,000 fl. in the previous year, and the dividend is at the rate of 10 per cent.

# Stocks and Shares.

TUESDAY EVENING.

MR. SNOWDEN has stepped to the front of the stage upon which politics and finance were engaged, and, by his grave warning in regard to the manner in which the nation is over-spending its capital, has influenced a particularly unfavourable effect upon prices. The air may be clearer before these paragraphs are in print; but, at present, the uncertainty as to the Chancellor's intentions in relation to the Budget deficit, which he is already facing, hangs as a weight around the neck of investment, and lays a heavy hand upon any spirit which might be left for speculative enterprise. Such securities as the 4½ per cent. debenture stocks of the Central Electricity and London and Home Counties Authorities, and the 5 per cent. debenture stock of the London Power Corporation, have felt the effect of Mr. Snowden's vague lucubrations. Central Electricity Board 4½ per cent. debenture at 3 discount is £2 down, and the London and Home Counties stock at 2½ discount is 25s. lower than it was this time last week. Central Electricity 4 per cent. at 85 has lost 2, and London Power 5 per cent. new scrip receded ⅛ to 1¼ premium.

### Home Railway Prior-Charges.

The Home Railway prior charge stocks standing in the trustee list are mostly easier, for the railway dividend distributions, with the exception of those from the Underground Electric group and the Great Western Railway, have proved disappointing. It may be of service to mention that there is £10,000 Central London 5 per cent. debenture, 1985-1995, on offer at 102½, yielding £4 18s. per cent., and with January and July interest payments. A similar return can be obtained from £5,000 London Electric 5 per cent. debenture of the same date, offered at 103½, but free of stamp. These are the only considerable amounts of stock at present available in the Underground group, the débacle in British and other Government stocks having left the Undergrounds unmoved.

### London Railway Dividends.

The announcements of the Underground Electric Railway Company of London are regarded as satisfactory, more especially the dividend of 5 per cent., making 8 per cent. for the year, on Underground Electric ordinary shares. This dividend is paid on a substantially larger share capital than was the case last year, because of the conversion of the greater part of the company's 6 per cent. income bonds into ordinary

shares. The price is unchanged at 23s. Particulars of the other dividends of the group will be found under "City Notes." The London & Suburban Traction Company is paying nothing on its 5 per cent. preference shares, but the carry-forward of £57,500 is about £11,000 better than that of a year ago. Arrears of dividend on the shares are now over £825,000. The only company in the list which has increased its dividend is the Associated Equipment, whose 10 per cent. for the year, free of tax, shows a rise of 2 per cent. Metropolitan Consolidated stock has gone back to 59, showing a point fall. London United Tramways 4 per cent. debenture stock continues to advance, and at 60½ is the fraction higher.

British Electric Traction deferred is down 75, to 1300, and the 8 per cent. preferred has drooped to 132½.

## Home Electricity Issues.

Mention has already been made of the dulness in debenture stocks of the three principal power authorities, and, apart from these changes, no further alteration has occurred in the London list. The dividends which are now appearing are on a par with those of a year ago. Mr. Herbert Morrison, the Minister of Transport, vindicated himself from the charge made against him of nursing the electricity industry at the expense of gas, and claimed that there is room for both branches, gas and electricity alike. Isle of Thanet shares are steady at 23s. 6d. on a repetition of the previously-paid 4 per cent. dividend. Egham & Staines at 38s. 3d. are a trifle down. The North Metropolitan Electric Power Supply Company, in its report, shows an increase of nearly £18,000 net revenue. The company has an additional amount this year to pay for interest charges, and reserve funds are generously treated. The ordinary shares stand at 48s. 7½d.; the dividend for the year is 10 per cent.

The meeting this week of the Power Securities Corporation was notable for a fighting speech by the chairman, Mr. George Balfour. The speech, worthy of being read in detail, told of progress having been made under difficult conditions. The Corporation has 4½ million pounds of work in hand. The price of the shares is, however, lower at 25s.

## Overseas Electrics.

Calcutta Electric new shares, one of which was offered at 31s. in respect of every five old shares held, came to market at 3s. 6d. premium, rose to 6s. 6d. premium, and reacted to 4s. 9d. premium. There has been a tolerably active demand for these shares from the Continent, but, as soon as the buying ceased, the price fell back somewhat sharply, Indian issues of all kinds being out of favour. The old shares dropped to 38s. Further falls have taken place in some of the Australian issues, Melbourne Electrics, for example, being down 10 to 130. Amongst the foreign stocks, Mexican Light and Power recovered a couple of points to 48½. There has been lively activity in Brazilian Tractions, but the net result of fairly wide movements is no more than a decline of ½, to 27. Anglo-Argentine Tramways 5 per cent. debenture, after its heavy fall, has recovered 3 points to 31½. The 4 per cent. first debenture, however, is lower at 58½, and the 4½ per cents. gave way to 56½, showing falls of 1½ in each case.

## Manufacturing Shares.

The trade position in the United States is said to be straightening out, and, although reports from that country are received with a good deal of reserve, the results of past experience, it would seem as though industrial conditions have taken a turn for the better. This is reflected in a fresh demand for American utility shares. Prices go up and down somewhat jerkily, inclining on balance to the higher side. British companies whose shares are affected by Wall Street conditions show a tendency to harden. General Electrics are better at 46s. 3d. Associated Electrical Industries strengthened to 22s. In the list of other manufacturing companies' shares the price movements are negligible. Henley's declined to 5⅞; British Thomson-Houston preference to 24s. British Aluminium have shed a few pence, at 30s. English Electric ordinary at 7s 6d. have come into line with the price of the preference shares. Business was marked the other day in Brush ordinary at 104.

## Cables and Wireless.

Improvement occurred in the trio of Cables & Wireless stocks on the official announcement that the preference dividend, due next month, will be duly paid. This was forecast by the chairman as long ago as last July, but trade conditions have been so adverse since that time that doubts began to be entertained as to whether the company could meet the obligation. Similar doubt now arises in regard to the dividend payable at the end of September next, and until business conditions improve this same uncertainty may be felt with the recurrence of each half-year. Canadian Marconi shares have been a quieter market, and the price slipped back to 15s. 9d. Globe ordinary rose 10s. in sympathy with the gains in Cables stocks. No changes of consequence have occurred in the Anglo-American group. American Telephone & Telegraph and International Telephone & Telegraph are 200 and 32½, respectively. The rubber share market is depressed by the weakness of the price of the product. Iron and steel shares show a dull disposition.

# Share List of Electrical Companies.

### Home Electricity Companies.

| | Nom. £ | Approx. Dividend. 1928. | 1929. | Price Feb. 17 1931. | Rise or fall. | Yield p.c. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole | 1 | 15 | 15 | 3⅛ | — | 4 16 1 |
| Brompton Ordinary | 1 | 8½ | 8½ | 27/6 | — | 5 1 10 |
| Central Electricity 4½% Deb. | Stock | — | — | 92½ | −2 | 4 17 3 |
| Charing Cross Ordinary | 1 | 8½ | 8½ | 29/- | — | 4 16 7 |
| Chelsea | 1 | 8⅞ | 8⅞ | 27/6 | — | 5 1 10 |
| City of London | 1 | 10 | 10 | 36/3 | — | 5 10 3 |
| Clyde Valley | 1 | 8 | 8 | 34/6 | — | 4 12 9 |
| County of London | 1 | 7 | 10 | 48/9 | — | 4 2 0 |
| Edmundsons' 7% Pref. | 1 | 7 | 7 | 25/6 | — | 5 9 10 |
| Elec. Supply Corporation | 1 | 11 | 11 | 48/9 | — | 4 11 0 |
| Kensington Ordinary | 1 | 8 | 8 | 28/6 | — | 4 18 3 |
| Lancs. Light and Power | 1 | 7½ | 7 | 26/- | — | 6 1 9 |
| London & Home Counties 4½% Deb. | Stock | — | — | 93½ | −1½ | 4 16 9 |
| London Electric | 1 | 8½ | 9 | 32/6 | — | 5 10 9 |
| Metropolitan | 1 | 9 | 10 | 42/- | — | 4 15 3 |
| Midland Counties | 1 | 6½ | 7 | 28/6 | — | 4 18 3 |
| Mid. Elec. Power | 1 | 15 | 8 | 31/3 | — | 5 2 5 |
| Newcastle-on-Tyne Ordinary | 1 | 6 | 6 | 23/9 | — | 5 1 1 |
| do. 7% Pref. | 1 | 7 | 7 | 27/6 | — | 5 1 10 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 11½ | — | 5 6 8 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 24/- | — | 5 0 0 |
| St. James' and Pall Mall | 1 | 8 | 8 | 28/6 | — | 4 18 3 |
| Scottish Power | 1 | 8 | 8 | 30/- | — | 5 6 8 |
| South London | 1 | 8½ | 8½ | 28/- | — | 5 0 0 |
| Urban Ordinary | 1 | 7 | 7 | 29/6 | — | 4 15 0 |
| Westminster Ordinary | 1 | 8½ | 8½ | 29/- | — | 4 16 7 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 25/6 | — | 5 17 8 |
| Yorkshire Elec. | 1 | 8 | 8 | 34/6 | — | 4 12 9 |

### Home Rails.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented | Stock | 4 | 4 | 80 | — | 5 0 0 |
| Metropolitan | ,, | 3½ | 4 | 59 | −1 | 5 18 8 |
| do. District | , | 4 | 5 | 77 | — | 6 9 10 |
| Underground Electric | £1 | 7 | 8 | 28/- | — | 6 19 2 |
| do. do. Income | Bonds | 6 | 6 | 104 | — | 5 15 5 |

### Telegraphs and Telephones.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 108½ | +½ | 5 16 0 |
| do. Def. | ,, | 1½ | 1½ | 35½ | — | 5 17 8 |
| Automatic Telephone | 1 | 10 | 12½ | 97/6 | — | 6 13 4 |
| Cables & Wireless 5½% Pref. | Stock | — | 5½ | 70½ | +4 | 7 16 0 |
| do. A 7½% Ord. | ,, | — | — | 20½ | +2½ | ... ... |
| do. B Ord. | ,, | — | — | 11½ | +1½ | ... ... |
| Globe Tel. and T. Ord. | 10 | 10 | 10 | 11½ | +½ | 8 18 10 |
| do. do. Pref. | 10 | 6 | 6 | 10½ | — | 5 17 1 |
| Great Northern Tel. | 10 | 20 | 20 | 29 | — | 6 18 0 |
| Marconi-Marine | 1 | 12½ | 15 | 36/3 | — | 8 5 4 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 28 | — | *5 1 1 |

### Home and Foreign Trams, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. | £ 5 | 5½ | 5½ | 1 | — | ... ... |
| do. do. 2nd Pref. | 5 | 6 | 6 | 12/6 | — | ... ... |
| do. do. 5% Deb. | Stock | 5 | 5 | 31½ | +3 | 15 17 4 |
| British Electric Traction Def. Ord. | ,, | 5 | 5 | 1300 | −75 | ... ... |
| do. do. Pref. Ord. | ,, | | 8 | 132½ | −2 | 5 19 0 |
| Brazil Traction | 100 | 7 | 8 | 27 | −½ | ... ... |
| Brit. Columbia Elec. Rly. Pfd. | Stock | 5 | 5 | 96½ | — | 5 3 7 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 11/6 | — | ... ... |
| London United Tram Deb. | Stock | 4 | 4 | 60½ | +½ | 6 12 4 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 54½ | — | 9 3 6 |
| Mexican Light Common | 100 | Nil | Nil | 48½ | +2 | ... ... |
| do. 7% Pref. | 100 | 7 | 7 | 66½ | — | 10 10 0 |
| do. 1st Bonds | — | 5 | 5 | 78 | — | 6 8 0 |
| Victoria Falls Ord. | 1 | 15 | 15 | 58/9 | — | 5 2 0 |
| Yorkshire (West Riding) | | Nil | Nil | 5/6 | — | ... ... |

### Manufacturing Companies.

| | | | | | | |
|---|---|---|---|---|---|---|
| Assoc. Elec. Ord. | 1 | 6 | 6 | 22/- | +6d. | 5 9 1 |
| Babcock & Wilcox | 1 | 13 | 15 | 48/- | — | *6 5 0 |
| British Aluminium Ord. | 1 | 10 | 10 | 30/- | −6d. | 6 13 4 |
| British Insulated Ord. | 1 | 15 | 15 | 3⅛ | — | 4 10 7 |
| Brush Ord. | Stock | 10 | 10 | 105 | — | 9 10 6 |
| Callenders | 1 | 15 | 15 | 8½ | — | 4 16 1 |
| do. 6½% Pref. | 1 | 6½ | 6½ | 25/- | — | 5 4 0 |
| Crompton Parkinson Ord. | 5/- | — | 30 | 23/3 | — | 6 9 0 |
| do. 8% Pref. | 1 | 8 | 8 | 28/- | — | 5 14 5 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 23/9 | — | 6 6 4 |
| do. 5% Deb. | Stock | 5 | 5 | 94½ | — | 5 5 10 |
| Electric Construction | 1 | 5½ | 5 | 12/- | — | 8 6 8 |
| Enfield Cable Ord. | 1 | 20 | 25 | 4⅞ | — | 5 16 0 |
| English Electric | 1 | Nil | Nil | 7/6 | — | ... ... |
| do. do. Pref. | 1 | 3 | Nil | 7/6 | — | ... ... |
| Ferranti Pref. | 1 | 7 | 7 | 21/6 | — | 6 10 4 |
| G.E.C. Pref. | 1 | 6½ | 6½ | 25/6 | — | 5 2 0 |
| do. Ord. | 1 | 10 | 14 | 46/3 | +⅛ | 6 1 9 |
| Henley | 1 | 25 | 30 | 5⅞ | −⅛ | 5 2 0 |
| do. 4½% Pref. | 5 | 4½ | 4½ | 4⅜ | — | 5 2 10 |
| India-Rubber | 1 | Nil | Nil | 6/3 | — | ... ... |
| Johnson & Phillips | 1 | 10 | 10 | 36/9 | — | 5 8 10 |
| Siemens Ord. | 1 | 7½ | 7½ | 1⅛ | — | 7 1 2 |
| Telegraph Construction | 12 | 10 | 10 | 16½ | — | *7 5 6 |

*Dividends paid free of Income Tax.

# Our Foreign Electrical Trade.

## Electrical Exports and Imports during January.

THE Board of Trade returns for January show that there was a decline of over 25 per cent. in imports, as compared with the corresponding month of 1930, while exports fell by more than 35 per cent. Overseas electrical trade shared in these decreases, imports falling by practically 40 per cent. and exports by 28 per cent.

As compared with December last, electrical exports were down by £91,094, due principally to smaller shipments of machinery, insulated wires and cables and unenumerated goods and apparatus. These and other decreases were offset by a general rise of about £47,000 in the telegraph and telephone section. Glow lamp, and meter and instrument exports were higher. In comparison with January, 1930, exports of insulated wires and cables were almost halved by the decline of £158,075 in the value. A fall of a similar order occurred in the machinery section. In the telegraph and telephone section there was a net fall of £90,000, although submarine cable exports increased. In falling to £560,000, electrical imports touched the lowest level since April, 1929, since when the monthly total has been as high as a million pounds sterling (October, 1929). The decline from the December total was attributable mainly to falls in the value of imports of unenumerated goods and apparatus, machinery, telegraph and telephone apparatus, and batteries and accumulators. There was only one small rise—that in the case of switchboards. Meters and instruments showed the greatest decline from the January, 1930, figure, while machinery, glow lamps and cables were also largely responsible for the decreased total. For the first time for some months the re-export total was smaller than those of the preceding month and the corresponding month of the previous year. This was due to the fall in re-exports of telegraph and telephone apparatus which remained at a high level during 1930.

The inset table gives an analysis of electrical machinery exports during January. The situation disclosed is unsatisfactory, but some relief is afforded by the rises recorded for South American countries and Japan. There was a further large fall in exports to Australia and the shares of Europe, South Africa and India were also lower. It is worthy of note that although prices generally have fallen during the past year the "unit" value of exported electrical machinery rose from £154 in January, 1930, to £161 last month.

In considering the relative values of imports and exports it has to be borne in mind that while the value of imports represents the cost, insurance and freight, or the latest sale value of the goods, the value of the exports represents the cost and the charges of delivering the goods on board the ship (the f.o.b. value).

Another consideration is worthy of mention. The classification adopted by the British Customs is very rigid so far as electrical goods are concerned. On the other hand, the United States electrical exports include many items which fall into other sections in the British classification, and thus help to swell the total. We may mention, for instance, that bare copper wire and cable appear in the United States figures and not in the British, and there are numerous smaller items which, if segregated from the other kinds of goods with which they are classed, would help to increase the figures for electrical trade to an appreciable extent.

### Electrical Machinery Exports.

| Destination. | Quantities. Jan., 1930. Tons. | Jan., 1931. Tons. | Inc. or dec. Tons. | Values. Jan., 1930. £ | Jan., 1931. £ | Inc. or dec. £ |
|---|---|---|---|---|---|---|
| Europe ... ... | 765 | 415 | −350 | 141,626 | 83,975 | −57,651 |
| Japan ... ... | 29 | 30 | + 1 | 4,707 | 5.016 | + 309 |
| South America ... | 305 | 448 | +143 | 55,614 | 59,503 | + 3,889 |
| South Africa ... | 491 | 190 | −301 | 69,660 | 30,525 | −39,135 |
| British India ... | 529 | 394 | −135 | 88,238 | 71,072 | −17,166 |
| Australia ... ... | 568 | 164 | −404 | 79,620 | 21,273 | −58,347 |
| New Zealand ... | 190 | 186 | − 4 | 26,337 | 29,493 | + 3,156 |
| Canada ... ... | 259 | 72 | −187 | 25,267 | 10,537 | −14,730 |
| Other countries ... | 614 | 733 | +119 | 87,376 | 112,896 | +25,520 |
| Total ... | 3,750 | 2,632 | −1,118 | £578,445 | £424,290 | −£154,155 |

| | Exports. Electrical exports for Jan., 1931. | Inc. or dec. as compared with Dec., 1930. | Inc. or dec. as compared with Jan., 1930. | Imports. Electrical imports for Jan., 1931. | Inc. or dec. as compared with Dec., 1930. | Inc. or dec. as compared with Jan., 1930. | Re-Exports. Electrical re-exports for Jan.., 1931. | Inc. or dec. as compared with Dec., 1930. | Inc. or dec as compared with Jan., 1930. |
|---|---|---|---|---|---|---|---|---|---|
| Electrical goods and apparatus (unenumerated) ... ... | £199,824 | −£36,563 | −£59,036 | £115,642 | −£80,992 | −£25,991 | £7.938 | −£7,639 | −£2 298 |
| Insulated wires and cables ... | 169,967 | − 25,105 | − 158,075 | 60,952 | − 23,129 | − 37,046 | 6,992 | + 6.433 | + 6,297 |
| Glow lamps ... ... ... | 40,693 | + 3,918 | − 16,647 | 33.042 | − 18.149 | − 41.256 | 783 | + 243 | − 333 |
| Arc lamps and parts ... ... | 756 | − 1,527 | − 1 210 | 4,268 | − 315 | + 1,809 | 99 | + 99 | + 99 |
| Batteries and accumulators ... | 62,897 | − 9 579 | − 25,031 | 45,513 | − 34 398 | − 14,102 | 248 | − 491 | − 15,679 |
| Meters and instruments ... | 32,872 | + 7,100 | + 5 051 | 38,460 | − 1,695 | − 187,871 | 1,321 | − 1,957 | + 290 |
| Carbons ... ... ... | 644 | − 1.200 | − 241 | 9,449 | − 9,485 | − 9,803 | 217 | + 181 | + 181 |
| Switchboards (not telegraph or telephone) ... ... | 6.546 | − 2,662 | + 2,785 | 399 | + 267 | + 353 | 16 | + 16 | + 16 |
| *Electrical Machinery—* | | | | | | | | | |
| Electrical machinery (unenumerated) ... ... ... | 268,805 | − 22.868 | − 71.524 | 121,508 | − 71,234 | − 56,843 | 17,387 | + 5,146 | + 9,304 |
| Railway and tramway motors | 17.658 | + 4,698 | + 6,244 | — | — | — | — | — | — |
| Other motors and generators... | 137,827 | − 54,289 | − 88,875 | — | — | — | — | — | — |
| *Telegraph and Telephone Cable and Material—* | | | | | | | | | |
| Telegraph and telephone wires and cable (not submarine) | 72,670 | + 19,559 | − 25,827 | 3,017 | − 6,271 | − 1,485 | 66 | − 35 | + 66 |
| Submarine telegraph and telephone cable ... ... | 37,485 | + 7,717 | + 16,990 | — | — | — | 250 | + 250 | + 250 |
| Telegraph and telephone instruments and apparatus ... | 200,476 | + 19.707 | − 80,545 | 127,290 | − 56,670 | + 9 547 | 7,113 | − 13,315 | − 2,841 |
| Totals... ... ... | £1,249,120 | − £91.094 | − £495,931 | £559,540 | − £302.071 | −£362,688 | £42.430 | − £11,069 | −£4,648 |

# The British Industries Fair—II.

**Notes on the Electrical Exhibits and Functions at Birmingham and in London.**

THE Fair opened on Monday last and, although it is too early to judge results, there are indications that it will be as successful as its predecessors.

The guide to the Electrical Section at Birmingham prepared by the British Electrical Development Association is much more complete than last year's guide. It is a reprint of part of the classified section of the general catalogue of the Fair with ample memoranda space. The only criticism which may be made of the booklet is that a few of the exhibitors included are only remotely "electrical." A useful plan is included.

An official programme of events has been prepared for the guidance of visitors to the Birmingham Section. This contains brief notes on Birmingham's leading features; a useful street plan and a map of the surrounding country; full particulars of train and 'bus services, car-parking places, &c. Each day's events are set out on a separate page, and they include both business functions at the Fair and amusements available in Birmingham.

**The "Electrical Review" Stand, Birmingham.**

Presiding at a Press luncheon at the Birmingham Section on Friday last week, Mr. E. W. Bache, vice-president of the Fair, described the Fair as the only national movement towards improving this country's overseas trade. Mr. C. Holland Harper, chairman of the Fair board of management, stated on the same occasion that further building extensions would almost certainly be necessary in order to accommodate the exhibitors in 1932.

The British Government gave the customary dinner in connection with the Fair, at the Guildhall on Monday evening last. Mr. William Graham, President of the Board of Trade, was chairman, the Duke of Gloucester was the guest of honour, and there was a representative gathering of representatives of foreign and Dominion Governments.

In proposing the toast of "The British Industries Fair," the Duke of Gloucester said that the two main factors of successful trade were production of the right article at the right price and efficient salesmanship. In that scheme the Fair played an essential part in demonstrating to the world that British industry was more capable than ever of providing all kinds of goods which compared favourably with those of other countries. In an export trade campaign thorough reconnaissance and intelligence were as vital as in a military campaign. In the Overseas Trade Development Council and the overseas officers of the Department of Overseas Trade British industry had such a service. In carrying on the campaign some reorganisation and adjustment of outlook seemed to be called for. If this were achieved there was no reason why British industrialists should not be in the strongest position on the "decisive trade battlefields."

# Some of the Exhibits.

**A Further Instalment of Illustrated Notes.**

### Electricity in the Fair Services.

A number of manufacturers have contributed practical demonstrations of electrical plant to the Birmingham section of the Fair.

The overhead electric lighting is by the British Thomson-Houston Co., Ltd., the General Electric Co., Ltd., and the Revo Electric Co., Ltd. The electric heating and lighting in the Royal Dining Room is carried out with apparatus made by the General Electric Co., Ltd., and the Revo Electric Co., Ltd., and G.E.C. equipment is employed in the floodlighting of the car park. The floodlighting of the east car park and that of the outside of the Electrical Section is by the British Thomson-Houston Co., Ltd. A 5-ton mobile petrol-electric crane by Herbert Morris, Ltd., has been used in the arrangement of the exhibits, and the electric clocks have been supplied by Gent and Co., Ltd. The cable for the heating and lighting of the new dining and conference rooms was produced by Callender's Cable & Construction Co., Ltd.; the ironclad switchgear by the Midland Electric Manufacturing Co., Ltd.; switches and plugs by J. A. Crabtree & Co., Ltd.; electric lighting fittings by the General Electric Co., Ltd.; and fires by Berry's Electric (1928), Ltd. For the electric cooking in the "C" dining rooms a transformer, ovens, &c., were supplied by the General Electric Co., Ltd.; a roaster by the Jackson Electric Stove Co., Ltd.; hot cupboards by the British Electric Transformer Co., Ltd.; a range by Berry's Electric (1928), Ltd.; and switches and fuses by A. Reyrolle & Co. The oven used in the electric pastry-making demonstration is a G.E.C. product, while the mixers were provided by Russell & Co., Ltd., and C. O. Ericsson.

### Ellison Insulations, Ltd.

On this stand is being displayed a variety of "Tufnol" and other moulded insulation products made of synthetic-resin with paper, fabric and asbestos as reinforcing materials. The company specialises in synthetic-resin paper-base moulded material which is very strong mechanically, the fabric base being made for maximum tensile and shock-resisting strength. Fabric "Tufnol" is used for gears which are silent, oil-proof and waterproof, and its exceptional strength is indicated by its use for insulating rails on cast steel railway sleepers, for signal track circuiting, &c.

### Edison Accumulators, Ltd.

Various patterns of Edison nickel-iron-alkaline accumulators appear on this stand. These accumulators are produced at the company's new factory at Redditch, Worcestershire. Briefly, the positive electrodes of the Edison accumulator are made of nickel hydroxide, the plates being composed of a series of perforated nickel tubes filled with the active material. The negative plates are composed of oblong flat nickelled-steel pockets filled with oxide of iron containing a small quantity of mercury. The solution employed is potassium hydrate. The plates are housed in cold-rolled sheet-steel containers, which are nickel-plated. Many advantages are claimed for this type of accumulator over the lead-acid type. The construction is shown in fig. 25. This particular example is an "H.W." train-lighting cell.

### Revo Electric Co., Ltd.

The versatility of this company is again demonstrated by its Birmingham display. A prominent feature is a range of "Revo" electric cookers in various sizes to suit all families. The new mottled vitreous-enamel finish is again seen, and the "Superspeed" boiling plate is also available for inspection. The display of "Revo" fires shows that the range has been considerably augmented this season; among them are designs ranging from the small bowl fire to elaborate and costly designs. In these fires are incorporated the company's patent "Matchless," "Emitter," and "Radiabar" elements in both vertical and horizontal positions. New finishes are again prominent, and very effective use has been made of mottled vitreous enamel and chromium plating. Other domestic appliances, including irons, kettles (non-automatic and automatic), and hotplates, are also to be seen. The "Revo" electric fans, which are shown, include desk and wall fans, fixed and oscillating, ceiling fans, fans for ship work, and exhaust and porthole fans. Another feature is a range of "Revo" switch- and fuse-gear. Special attention is drawn to the cooker control panel finished to match "Revo" cookers. There are several examples of street-lighting fittings representing the latest developments in decorative and scientific illumination, and the company's illuminating engineers are in attendance to give information and advice. There is a comprehensive range of industrial reflector fittings, and watertight fittings, together with fittings for ships' use, &c.

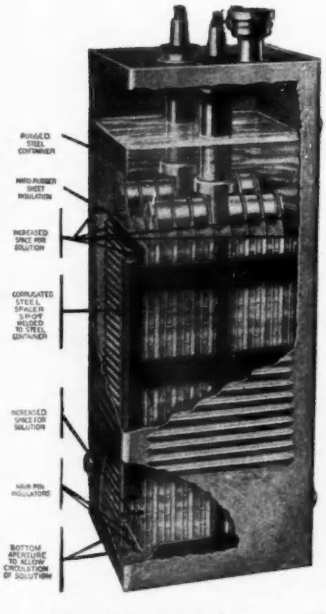


Fig. 25.—An Edison Train-lighting Cell.

Fig. 26.—A "Revo" Traffic Control Panel.

A new and interesting development is the manufacture of automatic traffic control signals, which are exhibited for the first time. The system employs standards for one-, two-, three-, and four-way signalling, and for various positions at road crossings, &c., and also the necessary control apparatus. The control-panel unit common to all the equipment is a self-contained unit for the automatic or manual control of traffic signals. A small specially-designed ball-bearing a.c. or d.c. motor is used to drive the mechanism for the automatic operation of the signals; this is unaffected by temperature or climatic conditions, and will withstand small voltage variations without upsetting the timing of the signals. The motor is connected through a universal joint to a robustly-constructed ball-bearing gear box. The drive through the latter revolves two disks, which in turn operate the switch mechanism for changing the signals. A third disk is provided with thirteen holes, six holes for north and south, and six holes for east and west. The other hole is common to both phases. Into these holes a movable pointer engages, and by the mere movement of this pointer 25 per cent. to 75 per cent. of "Go" or "Stop" periods on either N & S or E & W can be instantly obtained without changing a single connection. Each of these disks is fitted with a releasing cam for the amber light, whereby the period of the amber light on the north and south, or east and west can be varied independently. The panel is calibrated to give a total time cycle

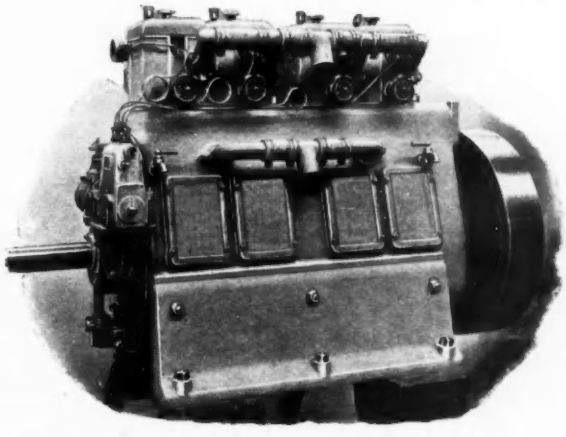


Fig. 27.—A New "Ruston" High-speed Engine.

of from 30 to 120 seconds, and a vernier regulating knob with a calibrated scale enables very fine adjustment to be obtained. The complete system is protected by a d.p. switch and fuses. A switch is also incorporated to cut out the automatic signals and to give a steady amber light on all signals at any time it is desired. For manual control a handle is provided and so arranged that a check takes place on the amber light between the changing of signals. The case can be supplied in cast-aluminium or cast-iron, for clamping to poles or walls, or mounted upon its own pedestal. The entire mechanism is mounted on a bronze panel inside the case, and this panel can be readily swung out for inspection, and to give access to motor, gear box terminals, &c. Fig. 26 illustrates one of the company's control standards.

### Ruston & Hornsby, Ltd.

The exhibits of this company consist of a wide range of medium-sized oil engines none of which have previously been shown at the Fair. Users of horizontal engines will be interested in the latest class "HR" engine. This unit runs on the "Ruston" principle of airless injection, uses either crude or residual fuel oils, and starts from cold without any form of preheating. Vertical engines are represented by two high-speed units. One engine, known as the "Mark VQ," is a 6-cylinder unit running at 900 r.p.m., at which speed the normal working load is 96 b.h.p. The other, known as the "JP" (fig. 27), is a 4-cylinder unit running at 1,000 r.p.m., at which speed the working load is 35 b.h.p. Both these models start from cold and run on a wide range of crude or residual fuel oils. A novel exhibit is the staging of engines in the course of erection. Engines are being shown running, dismantled and re-erected, ready for further running, one of the objects being to demonstrate to the power user how he can count on interchangeability whenever any replacements may be needed for a "Ruston" prime mover. In addition to the normal running engines of the "PB" type, there is to be seen a model in section to demonstrate the working principles. In view of the present-day need for fuel economy by all steam users, particular interest is being taken in the patented vertical boiler, with which an economy of at least 20 per cent. over the usual vertical boiler is claimed to be secured. A range of "Ruston" centrifugal pumps is also on view.

### Meldrums, Ltd.

This company is exhibiting a model boiler front on one flue of which is fitted its mechanical stoker of the sprinkler type which is claimed to be the only stoker made with a double or hollow front. The latter carries steam jets which enable extra or secondary air to be passed down and through the fronts; this air becomes heated in passing and is admitted to the furnace through perforated side baffles; being regulated by wheel valves it can be set to suit the rate of combustion and by this means smoke prevention is achieved. On the other flue is fitted one of the company's hand-fired forced-draught furnaces with closed ashpit under pressure by means of two steam jets per flue. Refuse destructors, acid-resisting metal, and other products are also shown.

### Earle, Bourne & Co., Ltd.

This company has on view a comprehensive range of its manufactures, including cold-rolled brass of various alloys, and copper; solid-drawn brass and copper tubes; brazed brass and copper tubes; angles, channels and sections; round cased and nickel-silver cased tube; aluminium angles, channels, sections, and ornamental tubes, &c.

### Murex Welding Processes, Ltd.

Arrangements have been made to show several novel items of interest relating to the company's various welding processes. The exhibits include transformer welding plant, atomic hydrogen welding plant, automatic welding plant, a Diesel-engine-driven two-operator set, and an Alloy Welding Processes

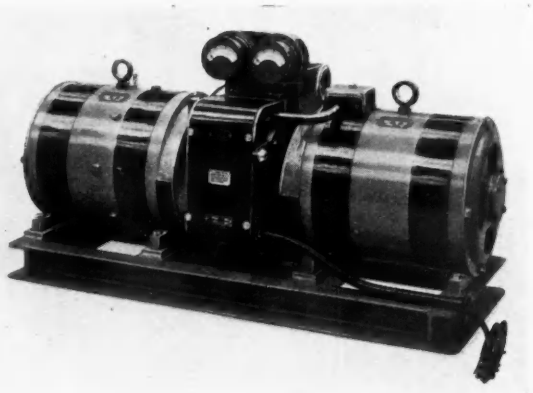


**Fig. 28.—An A.W.P. Motor-generator Welding Plant.**

motor-generator welding plant (fig. 28). In addition there are on show a large selection of electrodes, and demonstrations are given daily of oxy-acetylene welding of copper by the "Premag" process, and of automatic arc welding by the "Flexin" process.

### Fielding & Platt, Ltd.

Two oil engines are being exhibited by this company. One is the "Fielding" standard horizontal type, which is fitted with the company's patent sleeve injection pump, dual combustion chamber. The other is the latest type of vertical enclosed heavy oil engine. This is fitted with forced lubrication to all parts, which is carried out by means of two pumps, one of which supplies clean oil at high pressure throughout the engine; the other pump takes the used oil through the crank chamber, passes it through a filter under pressure, and thence to the sump from which the other pump draws the cleaned oil. The engine is being constructed in units of 2, 3, and 4 cylinders, rated at 50, 75, and 100 b.h.p., respectively.

### Richard Johnson & Nephew, Ltd.

The exhibit of this 150-year-old company comprises aluminium wire, copper wire, steel wire, steel cored aluminium wire, as well as bar and strip metals in various sizes and dimensions. Examples of "Crapo" galvanising are also being displayed. Eighty years ago the first submarine cable was laid between Dover and Calais, and this was sheathed with Johnson's wire. To-day, the company claims to be supplying a large proportion of the steel-cored aluminium wire used in the new electrification schemes.

### Symentis Products, Ltd.

The principal products on this stand are "Mastolite" switchboard panels, which are claimed to possess a very high dielectric resistance and tensile strength, at the same time being very light. These panels are manufactured in the following finishes:—Mirror, dull, standard, slate, marble, mahogany, oak and walnut, in thicknesses from ¼ in. to 2½ in. A new cable-covering varnish, "Mastoloze," in black and red; and a jointing compound "Ardazell," which withstands high temperatures without disintegration are also on view. The company shows manufacturers of mouldings how to make their own moulding powder by using "Symentis" liquid cement as a binder. There is also a display of moulded articles made according to the company's formula.

### Davis & Timmins, Ltd.

In addition to its standard turned screws, terminals, and metal parts for electrical fittings, this company is showing numerous examples of high class repetition work in various metals made from the solid bar. The exhibits are classified to show components made for various trades, most of which are made to special designs.

### George Bray & Co., Ltd.

As last year, this company is showing a selection of "Chromalox" electric heating elements. These elements consist of an 80/20 nickel-chrome resistor embedded in a refractory body, the whole of which is enclosed in a chromium-steel sheathing, which is treated by a patented process to impart a black oxide surface and to mature the refractory upon subsequent firing. These elements are made in the form of rings and strips and in these forms are used for a large and increasing number of industrial and domestic electric heating applications. The company states that during the past year there has been a considerable increase in its overseas trade. Many improvements have been made recently in these units, especially in the case of rings used as range plates on electric cookers and electric boiling plates. These have been completely re-designed, and now consist of two concentric ring units mounted on a new design of casting. They can be supplied complete with fully protected spill-proof plug-in terminals, either for vertical or horizontal mounting. The area of the elements has been increased, and while the same total loading is maintained on a given diameter ring the density has been reduced from 50 to 35 watts per sq. in. The thickness of refractory between the resistor wire and the sheathing is much reduced. This allows of more rapid heat dispersion from the resistor and a consequent lower operating temperature. The company has had plates under load for more than 7,000 hours, without any sign of buckling or warping of the sheathing. These new plates owing to their small mass have a high efficiency from cold. With a loading of 1,750 watts, three pints of water is raised from 50 deg. F. to boiling point in 10.6 minutes, giving an efficiency of 57 per cent. The plates have the ring elements mounted upon an attractive enamelled casting, all connections being guarded against spill-over, and being very easy to keep clean. There are also new designs of reduced cross-sectional area elements suitable for kettles, wash-boilers, irons, &c.

The exhibit also includes a complete range of water heaters, including a new water circulator heater readily adaptable to existing domestic water cylinders, and a range of convection heaters; electrical porcelains and refractories; and a complete range of the "Bray" lampholders.

### W. Canning & Co., Ltd.

The exhibits of this company include several interesting new features. A motor-driven polishing lathe is being shown with motor and drive embodied in the machine, giving all possible clearance around the mops. The spindle is driven by multi-V belt drive from the motor, the latter being mounted on a hinged plate fitted inside the main casing. The belt tension adjustment is made by operating hand wheels at the back of the machine to raise or lower the hinged plate carrying the motor. The startor is carried inside the main casing, and is operated from the front of the machine. The back of the machine has a sheet metal cover which can be easily removed to give access to the motor, startor and drive. An inspection door is also fitted on the front of the machine. Other interesting new items include an electric cable heater for plating solutions and for cleaning and swilling vats, and a portable

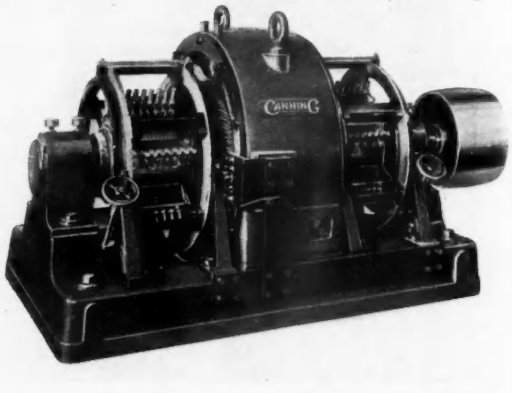



**Fig. 29.—A Canning Type O.P.L. Dynamo.**

filter for nickel solution. Considerable improvements have been made in automatic polishing apparatus for hollow-ware and special shapes, vertical rod and tube polishing machines, and knife polishing machines. Several developments have been made in low-voltage equipment required in electrolytic processes, and a number of dynamos and motor-generators are on view. A notable example of these is the type O.P.L. dynamo of 5,000-A capacity, which has a double commutator and is provided with roller bearings and double thrust washers (fig 29). In addition to the foregoing, a range of standard products of the company is being shown, including polishing motors and lathes; a single cabinet lacquer spraying plant, complete with new gravity feed container fitted to the top of the cabinet and new air filter; and materials for plating and metal finishing.

### Birmingham Electric Furnaces, Ltd.

This company's exhibit comprises four electric furnaces, three of which are new designs and have not been shown previously. The model of the greatest interest is a continuous cast-link conveyor furnace, a type which has not previously been available in this country. Fig. 30 shows a "Birlec" furnace of this type. This furnace has a wide range of applications, but is principally intended for the heat treatment of large quantities of small parts; it uniformly heat treats large quantities of such parts, and automatically quenches its charge at the correct temperature. The conveyor belt consists of cast nickel-chromium links joined together by nickel-chromium rods, and is provided with high flanged sides so that work will not roll off. The driving mechanism consists of two cast nickel chromium drums, one at each end, driven by an electric motor through variable speed reduction gearing. Only a short length

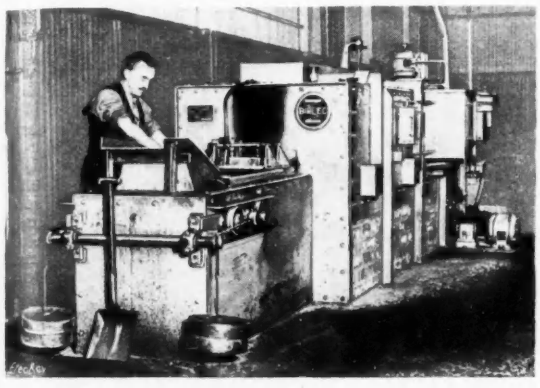


**Fig. 30.—A Continuous Conveyor Furnace.**

of the conveyor is exposed at the entrance end of the furnace for loading purposes. The conveyor slides over smooth cast nickel-chromium hearthplates, which take the weight of the work, and returns on skid rails of similar material. The heating elements consist of the usual "Birlec" heavy section nickel-chromium strip, supported on nickel-chromium hooks—a patented feature—located above and below the conveyor. The furnace exhibited has a belt 24 in. wide, the heated portion being 7 ft. long. It has a maximum rating of approximately 70 kW, and is divided electrically into two zones, each of which is separately and automatically controlled. Another new design shown is a furnace for the accurate hardening of modern high-speed steel tools. The outstanding features are control of furnace atmosphere together with uniformity and rapidity of heating. Ideal conditions in a furnace of this type are provided by a neutral or slightly reducing atmosphere, so that the steel being treated is neither carbonised nor decarbonised. The heating elements are "Globars," which extend from front to back along the two sides of the furnace. The furnace has a maximum rating of 20 kW, the hearth size being 12 in. long by 8 in. wide, and the door 6 in. high. To work in conjunction with the high-speed steel-hardening furnaces described above, the company has also introduced a new range of small box type furnaces, one of which is shown. This has a rating of approximately 9 kW, and is equipped with a transformer to give a low voltage on the furnace so that heavy section strip heating elements, similar to those used in the company's larger installations, can be employed. One of the company's circular portable type furnaces is also on view.

### S. O. Bowker, Ltd.

The "Tenby" wiring system is exhibited by this company. The principal new features of this system have been dealt with recently in our "New Devices" columns, but it may be said that these are a bakelite junction box designed for the side entry of one, two or three twin cables at four points, or for back entry at two points; and a bonding cup and plate of special design.

### John Thompson (Wolverhampton), Ltd.

Upon this stand there appears a "John Thompson" dish-ended Lancashire boiler, 30 ft. long and 9 ft. 3 in. in diameter, complete with "Thompson" steam fittings, in position, suitable for a working pressure of 200 lb. per sq. in. This type is built for any working pressure, up to and including 250 lb. per sq. in. and corrugated flues are fitted throughout. Over 4,000 of these boilers have been built since 1908.

### Maestrophone Radio Gramophone & Wireless Co.

A selection of "Maestrophone" all-mains radio-gramophones is exhibited on this stand. Three models of this handsome instrument are available—the "Popular," "De Luxe," and "Everest," and each is obtainable in oak, mahogany, or walnut. In the "Everest" model two moving-coil loud-speakers are employed, one to reproduce the higher and one the medium and lower frequencies. A number of other radio instruments are being shown, together with various examples of "Maestrophone" loud-speakers.

### Guest, Keen & Nettlefolds, Ltd.

Besides a representative display of wood screws, bolts, nuts, &c., this company includes on its stand a number of products for the manufacture of which it is not so well known, such as porcelain enamelled screw hooks, screwdrivers, pliers, ratchet braces, and various other tools.

### Gramo-Radio, Ltd.

The outstanding feature of this company's exhibit is the "G.R." sound equipment for "talkie" work. Of particular interest is the "G.R." logarithmic horn of which the throat is constructed of a special aluminium alloy possessing several advantages. Other items of note are gyroscopic synchronisers, amplifiers, faders and change-over units.

### Crane Foundry Co., Ltd.

A very large variety of soft grey iron castings, ranging in weight from a few ounces to half a ton, form the exhibit on this stand. The company specialises in supplying castings for all branches of the engineering, electrical and wireless industries.

### H. E. Ashdown (Birmingham), Ltd.

This company is exhibiting a large variety of mouldings in bakelite and similar materials as used in a variety of trades, including a number of electrical componente.

### George Ellison, Ltd.

This company is showing examples of switchgear for the control of electric power and machinery in factory, mill, mine and industrial works. The exhibit includes pole-mounting, air-break switches for overhead power branch lines up to 33,000 V, of which a new 11,000 V specimen is shown; 11,000-V cubicle and truck type metal-clad units for indoor sub-stations; heavy current 660-V metal-clad switch units for the secondary side of power transformers; drawout and non-drawout types of power distribution switchgear; and double-tier switchgear for sub-stations where floor space is limited. The metal-clad cubicle type of switchgear unit for 11,000-V sub-stations is the best type from the point of view of general utility. Any combination of component parts can be arranged and the cubicle can be sub-divided and built as required, with all connections visible and accessible. The circuit breakers are of high rupturing capacity and are fitted with the usual automatic

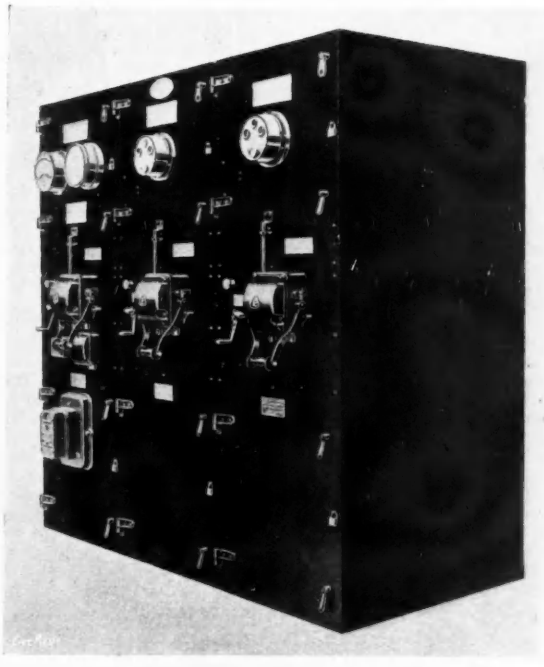


**Fig. 31.—A 11,000-V Consumers' Sub-station Switchboard.**

releases. The isolators may be of the type operated by a hooked insulated rod, or may be operated by a lever-handle on the front interlocked with the breaker. Interlocks are arranged to prevent operating mistakes and to secure the doors. Fig. 31 illustrates a three-unit consumer's sub-station switchboard of this design, as standardised by the Birmingham Corporation Electric Supply Department. For controlling motor driven machinery several types of starting and protecting gear are shown, including drum type controllers, star-delta and auto-transformer startors and rotor resistance startors with circuit breakers. Limit switches, solenoids, cable end couplings and other accessories are also included in the display, as well as flameproof circuit-breakers and startors for mines and other places where the atmosphere may be inflammable.

### Wardle Engineering Company, Ltd.

A representative selection of "Wardle" lighting equipment includes "Workslite" reflectors (incorporating the company's patent easy wiring cap and Home Office type skirted lampholders), gastight lanterns, and Bruce street-lighting lanterns, of which approximately 1,000 have been installed in the city of Salford. A special display is being made of "Prismat" bulkhead fittings for the lighting of corridors, ships, subways, &c., where directional lighting is required. The recently-introduced "Maxheat" oval tubular electric heaters and the already well-known "Maxheat" gilled tubular heaters are being displayed, as well as the latest additions to the company's range of lighting units. The "Wardle-Bray" traffic signals (fig. 32) and controllers are also being shown in operation. The "Wardle-Bray" traffic timer is a distinct departure from conventional design incorporating many novel features, and is arranged for automatic or manual control and suitable for either a.c. or d.c. circuits.

### Pneulec, Ltd.

Of the various items of foundry equipment exhibited by this company, the "Silkysand" conditioner is of particular interest. This machine is shown for the first time, and is a sand disintegrator of an entirely new design. It is a direct-coupled machine with a 3-h.p. totally-enclosed electric motor placed overhead away from sand and dust; it is designed either for standing on legs or for suspension from a crane hook, and is easily portable. Another type of sand conditioner to be seen on this stand is the "Pneulec Royer" sand-mixing machine, which operates on the belt principle, the belt being of canvas rubber composition on which are mounted rows of specially shaped teeth. Demonstrations are being given of an entirely new design of power squeeze moulding machine (fig. 33). This is actuated on the magnetic principle, and is claimed to be the only machine of its design in the world. The magnetic portion is entirely enclosed in the machine, and moisture and sand cannot get into the coil or any working parts. Provision is made for proper adjustability, and the height of the pattern table and squeeze head can be set as required. The speed of pattern draw can be varied either mechanically or by using an oil of different thickness in the dash pot in the base of the machine. Other items of equipment include a high speed electric swing frame grinder, an oilsand mixer, and the bottom section of 3½-ft. diameter cupola.

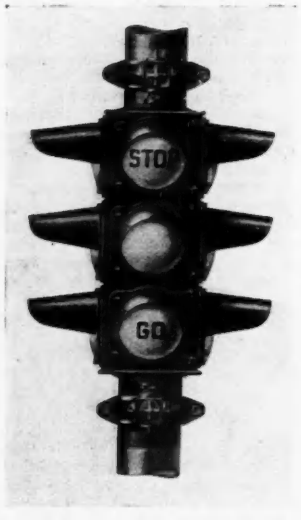



**Fig. 32.—A "Wardle-Bray" Three-way Traffic Signal.**

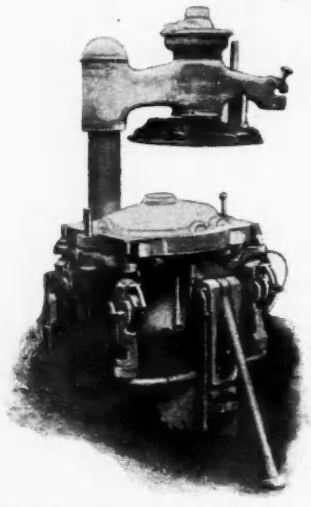


**Fig. 33.—A Magnetically-operated Moulding Machine.**

**Fig. 34.—The New "Magnet" Thermal-storage Cooker.**

### General Electric Co., Ltd.

This stand is adjacent to that of the British Electrical Development Association, and is an island site divided into three portions. The ends are devoted, respectively, to water heating and domestic cooking, since the company found from its experience last year in connection with industrial furnaces that concentrating on one or two specific departments is a better policy than attempting to cover the whole of its organisation. The centre pavilion includes representative examples from other departments, such as a vacuum cleaner and floor polisher, a few motors and a flasher in operation, while it is illuminated by "Osram" lamps in "Emblique" fittings. There are also a number of neon signs on the outside, and showboards dealing with electric lighting supplies, conduit and bell accessories.

The range of "Magnet" electric storage-water heaters on view vary in capacity from 2 gallons to 30 gallons. The latest range is known as the "Two-five-twelve" series, representing the three sizes (tank capacities in gallons) which constitute the range. Although they form part of the main stock line of seven sizes, they have special features They are designed essentially for wall mounting with brackets, and are domed top and bottom to give a neat appearance. The inlet and the outlet are both in the bottom of the tank. All the usual "Magnet" features are embodied, such as a special withdrawable-type immersion heater; patent bi-metal quick-make and break thermostat; efficient lagging; and side hand-hole for convenience of cleaning interior. All the working parts of these water heaters are mounted on one plate, which serves the dual purpose of carrying the heating elements and thermostat, and of covering a cleaning hole. The heating elements and thermostat may be removed from the apparatus plate without interfering with the water supply. Components of the type incorporated in large industrial thermal-storage schemes are shown, and an electric circulatory system is employed in the heating of the lounge on the stand. Where there is no great difference between night and day rates for energy, this system can be economically used in many situations. The capital outlay involved is considerably lower than that in the case of a thermal storage scheme, and, in addition, there is considerable saving in floor space. In the same section of the stand can be seen examples of the "Oatway" type of electric hot-water radiator. The larger sizes of these can be controlled by a separately mounted 3-heat control switch. When switched on, having been "plugged in" to the nearest wall socket, they can be left without attention or adjustment for any length of time. As the water in the radiator cannot boil, and no "live" or glowing wires are exposed, the heating element being kept submerged in water, all risk of fire or accidents is eliminated. The radiators are available in three standard finishes, gilt, red granite, and matt black, and in four sizes, *viz.*, 500, 1,000, 2,000, and 3,000 watts. The outstanding exhibit in this section is the new "Magnet" thermal-storage cooker illustrated in fig. 34. This has an oven measuring 14 in. in height, depth and width. At the top, projecting into the oven, is a cast-iron block which is heated by a 500-W element. Below the block are shutters by which the heat from it can be admitted or excluded. In the bottom is another 500-W element, and a change-over switch ensures that one or other element is always in circuit. Below the bottom element is a small warming compartment. The upper surface of the cast-iron block can be used as a hotplate, and a cover is provided, as will be seen from the illustration. The upper element remains in circuit when the cooker is not in use, while the lower one is switched on when required. Other interesting exhibits are cookers designed especially to compete with foreign types in overseas markets. A single-oven unit of robust but inexpensive design is another new item of interest. Two new medium-sized cookers make their *début*. The first is a small, but very complete, model (D.C. 5766). It comprises an oven measuring 12 in. by 12 in. by 11 in., generous hot-plate equipment and a full-sized warming space housing a grill of useful dimensions. The larger model (D.C. 5759) has an oven measuring 12¾ in. by 13 in. by 14 in., a large warming cupboard, with grill, and two separate hotplates. A false back houses the connections and the switches are operated by means of long extension rods attached to the knobs on the switch panel. The older patterns of "Magnet" cookers finished in mottled light grey porcelain enamal are shown. "Magnet" totally-enclosed hotplates are being practically demonstrated on the stand.

### Dermatine Co., Ltd.

As in previous years this company is showing a representative selection of "Dermatine" products, including valves, belting, hose, tubing, bushes and rings. Specimens of moulded and special-shaped joints used in various electrical appliances and equipment are also on view.

### Credenda Conduits Co., Ltd.

This stand is a neo-classic building in imitation stone of striking appearance, in the same position as last year. The apparatus exhibited includes many fresh designs of cooking, heating, and water-heating appliances; street lighting and industrial lighting reflectors are also shown. Among the fittings in the last section is the new spotlight fitting illustrated in fig. 35. The "Creda" cookers embody the new series with plug-in elements and include two new models not previously shown—a baby cooker and a cabinet range. The baby cooker (fig. 36) can be fitted to an ordinary 15-A heating plug. The oven is 10¾ in. high, 11½ in. wide, and 10½ in. deep, with a 1,000-watt element. The patented combined boiler plate and grill in the hob (9 in. by 7 in.) has a loading of 1,800 watts.

**Figs. 35 and 36.—A "Creda" Spotlight and a Baby Cooker.**

The hob and door panel are finished in vitreous enamel. Among the fires many examples of the new season's designs and finishes are on view, also a new type of "Protector" kettle. A range of new design automatic water heaters embodying many improvements, immersion heaters and wash boilers are also displayed. "Credalux" street lighting fittings and many additional models and samples of improved patterns of industrial reflector fittings are demonstrated.

### George P. Cosway, Ltd.

The principal exhibit shown by this company is the "Dred-Nort" link disconnecting box (fig. 37), designed to meet the demand for a link disconnecting box which can be easily and quickly jointed with a minimum of labour and expense. This box consists of one main casting which contains a baseboard of special composition, non-hygroscopic, and possessing high insulating qualities. To ensure perfect insulation, this baseboard is further supported by four glazed porcelain insulators. Another item of interest is the "Cosway" disconnecting box,

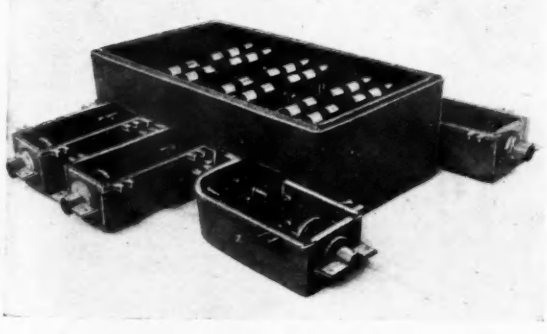


**Fig. 37.—A Six-way "Dred-Nort" Link Disconnecting Box.**

which comprises one base casting, a turret portion and lid, this latter being of the well-known "diving-bell" type which will stand a considerable head of water before any gains access to the box. The cable centre line of this box is particularly low, giving the jointer ready access for jointing purposes. A link service box, which has met with considerable demand in the Metropolitan area, is also being shown. This box has been designed principally to save the necessity of continually cutting the main distributor, the plumbing glands being split.

### Clear-Hooters, Ltd.

This year this company is concentrating on three types of horn. The first is the "Clarion" high-frequency electric horn for use on automobiles. This model is fronted with a chromium or ebony black dome, and its mechanism is entirely protected from the weather. For motor cycles or small cars, a slightly smaller model is available. The third item of note is another automobile horn somewhat similar to the one described above, but incorporating a trumpet.

### Crossley Brothers, Ltd.

The exhibits on this stand include examples of various types of vertical and horizontal type heavy (crude) oil engines, all shown in working operation. One of the most interesting models is a three-cylinder vertical compressorless Diesel engine direct-coupled to a 50-kW 220-V d.c. dynamo, which is representative of a range built in unit sizes having from 2 to 6 cylinders up to a capacity of 400 b.h.p. A four-cylinder horizontal enclosed crude-oil engine, having a normal rating of 88 b.h.p. at 375 r.p.m. is also being shown. This engine is complete with compressed-air starting equipment and uses the cheapest of fuel oil. It is specially suitable for factory driving where very steady turning is required and where headroom is limited. Another model of similar construction is available having two

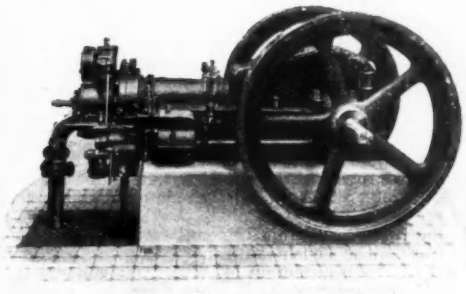


**Fig. 38.—A New Industrial Single-cylinder Oil Engine.**

cylinders, and a normal rating of 48 b.h.p. at 375 r.p.m. A new "Crossley" production comprises an industrial single-cylinder oil engine (fig. 38) cold starting, and rated at 15 b.h.p. at 400 r.p.m. This development is representative of a range of small horizontal crude oil engines built in sizes of 9, 11, 13, and 15 b.h.p., and recently placed on the market. The fuel pump and atomiser although extremely simple in construction, ensures perfectly clean combustion and economical working. The lubrication throughout is entirely automatic, a pump feed being arranged to the cylinder and piston.

### Babcock & Wilcox, Ltd.

Representative examples of Babcock heavy-oil engines appear on this stand—two of them being shown in operation. One of these engines is a 33-b.h.p. cold-starting type similar to that illustrated in fig. 39. Its special features are the absence of valves in the cylinder head; no skew gears, side shaft, cams or rocking levers owing to the elimination of air and exhaust valves; the accessibility of the working parts by the raising of a patented removable cover; instantaneous starting from cold; and low maintenance costs. The other engine shown in

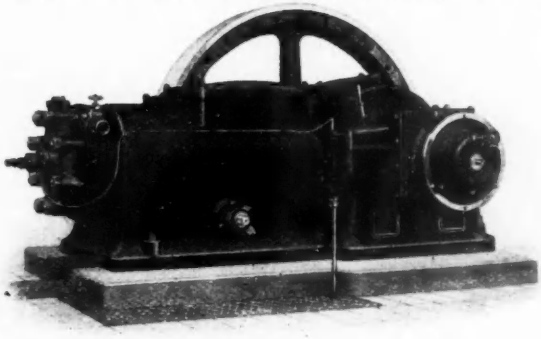


**Fig. 39.—A Babcock Cold-starting Engine.**

operation is a 15-h.p. medium-compression type. The company also shows sections of its interlock open steel flooring.

### Foster Instrument Co.

Electrical pyrometric instruments form the larger part of this exhibit and are of particular interest in connection with the various temperature measurements essential to efficient running of generating plants. The multiple record "strip" recorder is specially valuable for this purpose because distinguishable records of several related temperatures are made on the same chart. The company is showing a millivoltmeter which has the required sensitivity for use with a thermo-couple of normal industrial type, with a temperature-resistance co-

efficient so low that the user need not give any thought to instrument temperature and, at the same time, of such a high internal resistance that variations in the external circuit become entirely negligible. Fig. 40 shows this millivoltmeter at the top with the edgewise scale. Its performance is directly contrasted with that of a circular millivoltmeter, seen below, of relatively low resistance but, nevertheless, of good proportions and very low temperature-resistance coefficient, so that this low-resistance instrument can safely be used where no large variations in the external circuit are probable. The moving coil is mounted on a special construction, known under the trade name of "Resilia," which gives protection against shocks and vibration in all directions.

### British Sangamo Co., Ltd.

This company, whose works were described in our issue of December 5th last, is again exhibiting a comprehensive selection of its instruments including several types of watt-hour meters. A special exhibit is a new a.c. test bench (fig. 41) designed primarily for use in the company's meter factory. The bench is built up on an angle iron framework, the board carrying the control switches being of a special composition, of great mechanical strength and excellent insulating properties. The table is of hard wood covered in stout cork linoleum, and is arranged to take a standard type H.P.6 portable rotating standard. For testing several meters in series, extension racks can be provided which interconnect with the testing bench. Either single- or polyphase meters can be tested, the latter, of course, only as single-phase. On the front of the bench are mounted:—A main triple-pole switch and fuse, 18 loading switches, a main pressure fuse, 12 pressure plugs, two rotary control switches, and a rack to take the meter under test. A rotating sub-standard and a main tapping key are mounted on the table. At the back of the panel are all the necessary transformers, resistances interconnecting leads, &c. The bench is arranged to give up to a maximum of 100 A, and a minimum of .0125 A, at voltages from 100 to 550. Other leading exhibits are an a.c. test block which provides a means of connecting a check meter in series with a meter under test; a three-element maximum demand indicator meter; and a portable test meter for checking the accuracy of watt-hour meters.

### Holden & Hunt.

Messrs. Holden & Hunt are showing a representative range of their electric resistance welding machines. All the machines are shown in operation. A new feature is the "No. 1" spot welder (fig. 42), which has a capacity of 4 kW and can be fitted with 6-in. and 9-in. arms. The design is carried out on the lines of the larger machines and incorporates a multiple slot faceplate, swivelling top arm to enable any position to be obtained for the electrodes, and a cast-steel pedal with an automatic trip switch. The pressure exerted by foot and back shaft is transmitted to the top arm through a double toggle gear, so giving extremely heavy pressure on the weld. The machine has been specially designed for use in the thin sheet metal and wire trades.

**Fig. 40.—A "Foster" Millivoltmeter.**

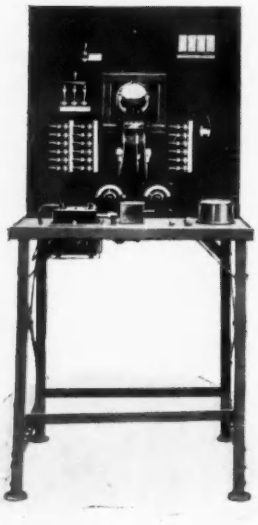


**Fig. 41.—"Sangamo" A.C. Test Bench.**

**Fig. 42.—A Small Electric Welding Machine.**

### F. Gilman (B.S.T.), Ltd.

In the past this company has specialised almost entirely in boiler and economiser scaling tools for use on steam-raising plant. A new departure is being made this year, and a very wide range of flexible-drive tools are now being manufactured for every purpose. A typical example of these new "Multi-flex" machines is the type "M" four-speed set (fig. 43). This portable tool is mounted on feet with castors. The motive power is provided by an electric motor which has a horizontal movement of 360 degrees as well as a vertical movement, thus taking all strain off the flexible drive. The drive is by means of a rubber belt on four-step cone pulleys which give four speeds—850, 1,750, 2,375 and 3,000 r.p.m. Belt change is effected by two levers and occupies only a few seconds. A wide variety of working heads can be operated off either a straight drive handle or a right-angle drive handle, and the machine can be used for wire-brushing, polishing, milling, die-sinking, tire-rasping, wet rubbing, and polishing cellulose work, &c. The machine can also be provided with a high-speed drive which gives an additional four speeds of 3,400, 7,000, 9,500 and 12,000 r.p.m.

**Fig. 43.—"Multi-flex" Flexible-drive Tool Set.**

### Heatly-Gresham Engineering Co., Ltd.

On this stand is shown a fairly comprehensive range of the company's well-known "Rational" engines, covering powers from 2 b.h.p. to 28 b.h.p. An engine of the smallest size may be seen driving a centrifugal pump, the set being mounted on a two-wheeled trolley. There is also in operation a 5-kW dynamo set which is supplying light and power to other machinery which is on exhibition. No marked variations have been made in the design of "Rational" engines as compared with last year, although several small but important improvements are to be observed. Also to be seen is an example of a range of "Rational" vacuum exhausters. The model as shown is designed for testing purposes, but the exhauster itself may also be used for operating the brakes on Diesel and electrically-driven cars. Objects of more general interest include a display of drop forgings and pressings.

### Alfred Herbert, Ltd.

On this stand is being exhibited one of the company's small "Atritor" coal pulverisers. This machine has a capacity of 500 lb. of pulverised coal per hour and is suitable for firing a forge furnace, heating forgings up to about 12 in. square. The "Atritor" pulverising system feeds, dries, and pulverises the coal, and delivers the pulverised product to the burner without the use of subsidiary feeders and dryers. An "Atritor" machine similar to the one mentioned above is shown opened for inspection so that the whole of the interior can be seen, this exhibit being intended to demonstrate the advantages and efficiency of pulverised coal firing for metallurgical furnace work. The company is also exhibiting a wide range of engineers' small tools and workshop accessories.

### R. A. Lister & Co., Ltd.

The most interesting exhibit of this company is a new 18-b.h.p. Diesel engine (fig. 44). Difficult starting, the chief drawback of Diesel engines in the past, has been successfully overcome by the introduction of the "Lister" patent combustion chamber, which enables the engine to start by hand from cold without the use of cartridges, lamps, or electrical ignition. A new circular radiator is mounted at the opposite end of the engine from that at which the flywheel normally appears, thus making the engine more compact, and dispensing with the need for the additional height and space required for water-cooling tanks. A 6½-h.p. hopper-cooled petrol engine is also shown, as well as two examples of "Lister" pumps, a direct-coupled horizontal pump with electric motor drive suitable for working suction lifts of 25 ft. and heads up to 375 ft., and a deep well pump. An automatic system of plant operation, by which light loads are carried by a small battery and heavy loads by direct running from the plant has now been applied to a range of "Lister-Light" plants for the lighting of country houses. These plants are built in 2.5-kW, 4.5-kW, 10-kW, 15-kW, and 20-kW sizes, and can be obtained for direct running and battery charging, as well as for fully-automatic operation. Many improvements have recently been made in the "Lister Autotruck," and new two-ton models are on view. A special truck designed for milk delivery is also exhibited.

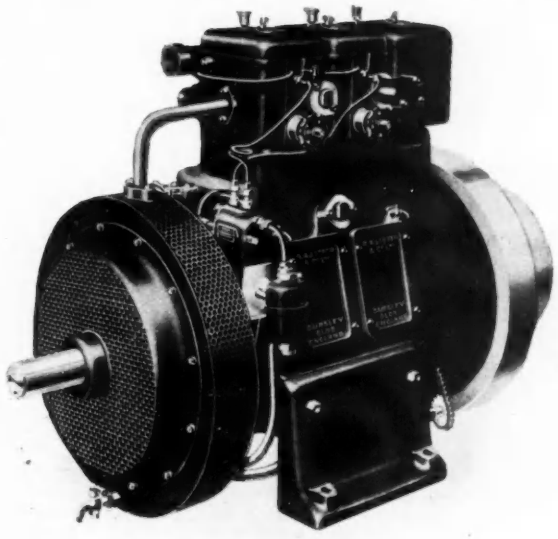


**Fig. 44.—A High-speed Diesel Engine fitted with Circular Radiator.**

# Exhibits at Olympia, London.

For the second year in succession the London section of the Fair is being held at Olympia, the whole of the available space being occupied by exhibits divided into seventeen main groups. A total of nearly 300,000 sq. ft., or 45,000 sq. ft. more than last year is taken up by exhibits. As our readers are aware, the main electrical section of the Fair is at Birmingham, only the lighter branches being represented in London. There is no definitely electrical section at Olympia, as, apart from the fact that the exhibits of synthetic moulding materials and articles produced therefrom are found in Section B and wireless and cognate goods in Section D, the electrical trader has to make a tour of practically the whole of the huge building if he wishes to inspect all the exhibits of possible interest to him.

Apart from the exhibits, the London section of the Fair is, however, again an electrical triumph, the temporary lighting and power load being, if anything, larger than ever, as, apart from the lighting of the additional sections of the building that were not available last year, each particular stand has its own lighting installation. The General Post Office, which has a stand on which is given a demonstration of the automatic telephone system, has installed, in addition to a number of public call boxes, several hundred special telephone connections on exhibitors' stands. Notes on some of the exhibits follow.

### Britannia Batteries, Ltd., & Pertrix, Ltd.

These two concerns have a combined stand on which are shown examples of "Britannia" accumulators and "Pertrix" primary and secondary batteries manufactured at Redditch. Samples of the Britannia and Pertrix accumulators are shown—some in section to make clear the design and construction of the plates for motor car and 'bus use, &c. There is also displayed a 14-cell battery, together with a "Pelapone" combined single-cylinder oil engine and 25-amp., 100/140-V generator for house lighting purposes. The Pertrix dry batteries are made in forms suitable for radio, pocket torch, and cycle lamp use.

### Marco Refrigerators, Ltd.

An excellent display of the British-made "Marco" refrigerators is made by this company. The appliances are made in various sizes ranging from those for domestic use up to large patterns for clubs, hotels, ships, hospitals, and public institutions. The plant comprises an electrically-driven compressor and a cooling unit consisting of a brine tank with expansion coils. In addition to a combined all-metal food-storage refrigerator and kitchen table exhibited last year, the company is on this occasion showing refrigerators finished both externally and internally in vitreous enamel and others with an external "Crazilose" finish.

### Darwins, Ltd.

In addition to safety razors and blades this Sheffield company specialises in the manufacture of cobalt steel permanent magnets, the display of which not only consists of magnets themselves in a wide variety of shapes and sizes, but also of a range of finished instruments made by different manufacturers in which "Darwin" magnets are used. These include telephone earpieces, radio loud-speakers, magnetos, ammeters, and galvanometers.

### James Neill & Co. (Sheffield), Ltd.

This is another concern which, in addition to razor blades and other steel goods, is devoting considerable attention to the production of permanent magnets of tungsten and cobalt steel for magnetos, meters, loud-speakers, and other instruments.

### Synchronome Co., Ltd.

A range of electromagnetically-controlled clocks is again displayed by this firm. The energy for operating the clocks is supplied by dry cells, an electric bell being set in the circuit in such a manner that it comes into operation when the cells tend to become exhausted.

### Ozonair, Ltd.

An interesting display is made at this stand of "Ozonair" apparatus for the purification and deodorisation of the air of offices, houses, &c. The company also manufactures plant for the commercial production of ozone, while another speciality is the "Ventex" air filter which is claimed to be capable of cleaning air to the point of sterilisation.

### Staines Kitchen Equipment Co., Ltd.

A prominent exhibit at this firm's stand is again an electrically-driven crockery washer designed for use in large institutions. The machine cleans crockery at the rate of 2,000 pieces per hour by means of a series of brushes belt-driven by a small electric motor well enclosed to protect it from the water. A new electrically-driven machine is the "Tenderit" puncturer, for rendering meat tender before cooking.

### Thermega, Ltd.

The "Thermega" electrically-heated pads and blankets which are here displayed are made suitable for use on any voltage between 100 and 250 V, and are supplied for either a single-temperature or with a variable three-heat (100, 130, and 160 deg F.) switch. The blankets are also available with a special plug contact, by means of which, when sufficiently warm, the user can switch off the current without removing his hands from under the bed clothes.

# Selected Radio-telephone Apparatus.

**Descriptive details of useful instruments and accessories available to broadcast listeners as aids to reception and better reproduction.**

THE present universal policy of increasing the power of broadcast radio-telephony transmitters is forcibly demonstrating the necessity for combining with reproduction quality improvement a degree of reception selectivity considerably greater than has hitherto been considered adequate for normal requirements. To that end Dr. James Robinson, formerly of the Royal Air Force Wireless Department, devised a receiver of unconventional design, adaptable for both telephony and telegraphy, which has induced a considerable conflict of opinion relative to the precise mode of operation of the circuit employed.

### " R.I. Stenode Radiostat."

RADIO INSTRUMENTS, LTD., now announce that they are manufacturing instruments of the type referred to above commercially under the patents of the British Radiostat Corporation, Ltd., and that they are prepared to accept orders from the trade. All the apparatus is housed in a figured-walnut cabinet (fig. 1) the whole of the controls being fitted to a narrow panel concealed at the top under the lid. The set is mains-driven and designed for use without an external aerial wherever a supply of electricity of 200 to 250 volts at 50 cycles is available, a plug adaptor being the only external connection needed. The controls provide for frame-aerial rotation and frame tuning by condenser; a medium- and long-wave change-over switch is provided and main tuning is by ganged condensers, the illuminated dial of which is calibrated directly in wavelengths; two scales are provided, one for long waves and the other for medium waves, the handle of the tuner being connected to a worm drive which can be thrown in or out of gear for quick or slow motion of the dial. Volume control is fitted and also an " on and off " switch. The frame tuner is only employed for the purpose of maintaining accurate syntony between the frame and oscillator. The seven valves are arranged as follows: the first is the initial high-frequency amplifier; the second is the autodyne detector-oscillator; the third and fourth are intermediate stages; the fifth is the second detector; the sixth is the low-frequency and tone-correction stage; and the seventh is the power output stage, which is choke-coupled to the moving-coil loud-speaker. All the valves are indirectly heated and full-wave rectification is employed; generous mains equipment avoids hum, the chokes, condensers, and resistances being of large size. A feature of the equipment is the large number of decoupling resistances and condensers employed to preclude any possibility of interaction between the various stages.

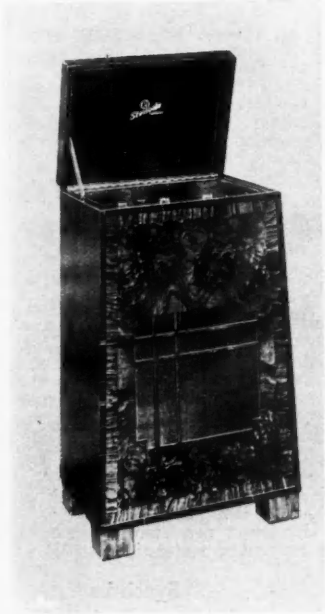


Fig. 1.—The " R.I. Stenode " Receiver.

The complete chassis of the receiver is fitted in a metal case, which is mounted at the top of the instrument; beneath it is a rotatable double-frame aerial, and below the latter a moving-coil loud-speaker. Finally, in the base of the instrument is fitted the complete mains rectifying and smoothing equipment. As single-dial main tuning is employed, the operation of the instrument is simple

New items which have been added to the company's range of accessories recently include a general purpose output filter choke, a power grid choke with a nickel-iron core, mains and general purpose transformers, and a dual-range coil.

### The " Synchrophone."

SYNCHROPHONE, LTD., has produced a novel triple-purpose home entertainment outfit of considerable interest. One cabinet (fig. 2) 22 in. by 22 in. by 4 ft. 1 in. high houses a wireless receiver and loud-speaker, a gramophone record turntable and electrical pick-up, and a kinematograph projector, together with accommodation for 24 films and 48 records. Means are incorporated for synchronising film and record for the reproduction of talking pictures, the whole being mains-operated electrically. Apart from mechanism simplification, sufficiently silent operation to avoid distraction in home use has been aimed at, and Mr. H. Knudsen (Danish) has succeeded in obtaining the necessary intermittent movement of the film (which must pass through the gate of the projector in a series of jerks, stopping and starting at least 16 times per second) direct from a rotary spindle without reciprocation (British patent No. 334,532) thus reducing clatter and enabling grease - graphite boxes to be substituted for oil lubrication. At any one moment at least six of the teeth of the sprocket wheel that moves the film engage the latter, so reducing the risk of tearing it, while the whole movement takes place in less than one-third of each revolution of the mica shutter; the film is therefore illuminated for more than two-thirds of the time, with consequent flicker reduction. The fan-cooled 250-watt lamp is of end-on design and provides ample light for a 4-ft. by 3-ft. screen 11 ft. from the lens. The universal a.c.-d.c. motor runs silently at 3,000 r.p.m. and low-voltage machines are available for battery operation. The turn-table is driven by the common shaft and is so geared that a fixed number of film pictures are exposed per revolution for synchronisation. Sound is amplified electrically and reproduced by the speaker of the radio set, which is of the 4-valve internal-aerial type with the usual controls, including speed and volume adjustment, and change-over switches for using the outfit as a gramophone or radio receiver separately. Any sub-standard (16-mm.) film and standard make of record can be used. When synchronised the film has a red starting picture (which is placed in the gate of the projector) and the record is marked at the starting point (on which the pick-up needle is placed). A film and record library is being organised for subscribers' convenience and the company's studio is available for customers who wish to make their own talking films. The sole selling agents for the British Isles are J. Curwen & Sons, Ltd.

Fig. 2.—The " Synchrophone."

### New Loud-speaker Chassis.

The STANDARD BATTERY CO. has sent us a sample of its new Model 31 double-cone speaker chassis which is shortly to become available to the public in 12-, 14-, and 20-inch sizes at prices considerably lower than those of the old type of Wates chassis, the good performance of which has been commented upon from time to time. The salient features of the new model are that both cones are scroll cut to ensure even tension over the whole surface and consequently good tone response to the impulses imparted to them. A new process is claimed to be applied to the treatment of the paper of which the larger cone is made and the latter's unusual method of suspension allows freedom of movement without affecting the even tension.

# New Electrical Devices, Fittings, and Plant.

**Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.**

## An Electric Battery Locomotive.

The vehicle depicted in fig. 1 is a standard-gauge battery shunting locomotive recently supplied to the Luton electricity undertaking by Messrs. GREENWOOD & BATLEY, LTD., Albion Works, Leeds. It has a hauling capacity of 100 tons at a speed of four m.p.h. on the level. The frame is built up of rolled-steel sections and is carried on laminated springs, forged-steel axles, and wheels with cast-iron centres and single-flanged

**Fig. 1.—" Greenbat " Electric Battery Shunting Locomotive.**

steel tires. The cab is totally enclosed and is fitted with central sliding doors. The locomotive is equipped with two standard "Greenbat" enclosed-ventilated traction motors, 170/180 V, 15 h.p. for one hour each, and a drum-type series-parallel controller with separate protected-type resistances. The battery, which is housed in two ventilated and weatherproof containers, arranged so that the battery may be removed and inspected easily, consists of 160 Edison 150-Ah cells. The electrical equipment is complete with the necessary instru-

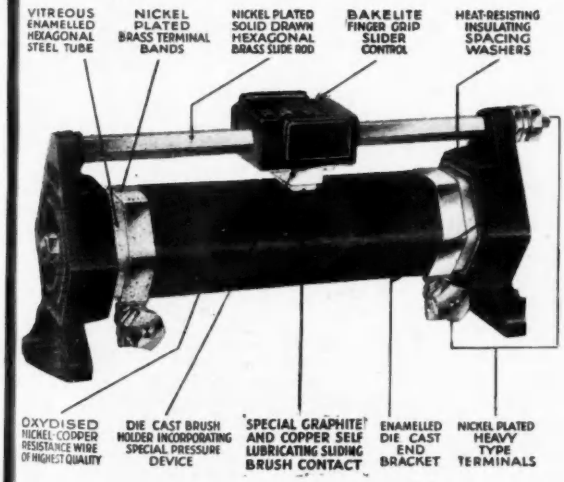

VITREOUS ENAMELLED HEXAGONAL STEEL TUBE
NICKEL PLATED BRASS TERMINAL BANDS
NICKEL PLATED SOLID DRAWN HEXAGONAL BRASS SLIDE ROD
BAKELITE FINGER GRIP SLIDER CONTROL
HEAT-RESISTING INSULATING SPACING WASHERS
OXYDISED NICKEL-COPPER RESISTANCE WIRE OF HIGHEST QUALITY
DIE CAST BRUSH HOLDER INCORPORATING SPECIAL PRESSURE DEVICE
'SPECIAL GRAPHITE' AND COPPER SELF LUBRICATING SLIDING BRUSH CONTACT
ENAMELLED DIE CAST END BRACKET
NICKEL PLATED HEAVY TYPE TERMINALS

**Fig. 2.—" Berco " Hexagon Sliding Resistance.**

ments and a charging plug and socket. A loud-sounding gong, operated by a foot-pedal, and powerful headlights operated from switches in the cab are other interesting electrical features.

## New Resistance Equipment.

Among the recent introductions of the BRITISH ELECTRIC RESISTANCE CO., LTD., Ohmic Works, Queensway, Ponders End, Middlesex, is a range of a new type of sliding resistances the standard construction of which is depicted in fig. 2. It consists of a hexagon vitreous-enamelled steel tube, wire-wound; the hexagon section has the advantage of having a flat surface over the slide contact, and it also obviates any twisting or movement of the bands when the resistances are overloaded. The construction of the sliding contact is in the form of a die-cast box travelling along a hexagon brass slider rod, and a special copper-graphite brush is held in position in the box by two springs, which give an even pressure on the resistance wire, making perfect contact. The copper-graphite brush has the advantage that, when a resistance of this pattern is warm, the graphite in the brush acts as a lubricant and prevents jamming, so that the brush runs more smoothly under load. The brush also has a perfectly flat contact, which is ground in over the surface of the wire, and does not tend to cut through the wire when in constant use.

This company has also just patented a new type of dimming resistance of the commutator type, fig. 3, consisting of a series of flat copper segments, mica insulated and arranged in a very compact form. For instance, the size of a 100-way 10-A equipment is approximately 10 in. long by 2¼ in. wide by 2¼ in. deep. Such limited dimensions offer a considerable advantage over the radial pattern. The copper segments can be graded in thickness to counteract the different ratings required in stage dimmers or charging apparatus, &c.

## A New " Sunlight " Lamp.

PHILIPS LAMPS, LTD., Philips House, 145, Charing Cross Road, W.C.2, have recently placed on the market the Philips " Ultrasol " sunlight lamp, which has been specially designed for home use. The apparatus has been constructed to operate from a.c. mains, and a tapped mains transformer enables a voltage range of from 100 to 250, 50 cycles, to be covered. The " Ultrasol," fig. 4, is designed with a view to electrical and mechanical safety, and connection to the mains is effected by an ordinary plug. The apparatus consists of four separate parts, a reflector with a holder and lead in wires, a stand in two parts, and a base comprising a transformer in a cast-iron case with the connecting leads. The entire outfit can easily be carried from room to room. A matt-silvered finish enables the equipment to be used practically anywhere in the home. The loading is about 140 watts.

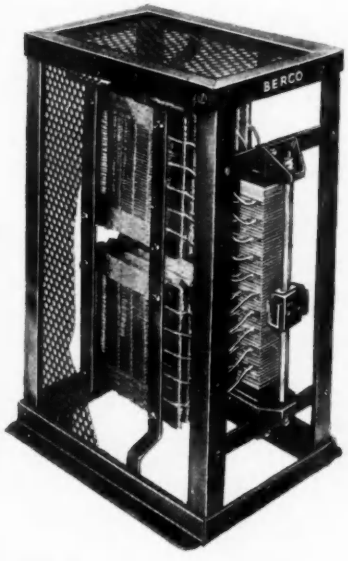



**Fig. 3.—" Berco " Commutator-type Dimming Resistance.**

**Fig. 4.—" Ultrasol " Sunlight Lamp.**

## A Skin-protecting Cream.

We have received from ROZALEX, LTD., 26, Cooper Street, Manchester, a sample of " Rozalex," a special preparation in the form of a cream for application to the hands before commencing any operation which may be injurious to the skin. By its use, it is claimed, the pores of the skin are effectively protected against any detrimental material; such as printer's ink, and the hands are maintained in a pleasant condition and free from cracks and chaps. An ordinary wash at the end of working hours will remove all dirt, together with the " Rosalex " film.

# Electric Coal-cutters.

## A comparison of some of the advantages of electric power over compressed air for cutting and conveying coal in underground workings.

*(Extracts from a paper read before the* ASSOCIATION OF MINING ELECTRICAL ENGINEERS.)

THE relative attributes and limitations of electric and compressed-air coal-cutters were discussed at a recent meeting of the London branch of the above-named Association under the chairmanship of Mr. J. R. Walton, branch president.

**Mr. W. C. Maitland,** author of the paper, remarked that the first power-driven mine coal-cutter was introduced more than 60 years ago. In 1929 some 60.2 per cent. of the total number of mines at work in this country used electrical equipment, 28 per cent. of the total output of coal in this country was obtained by coal-cutters of various types, and the aggregate of electric coal-cutters in use was 100,940 h.p. Some 80.5 per cent. of the total electrical h.p. used in collieries was produced by three-phase a.c. and, of the longwall coal-cutters in use in that year, 72.5 per cent. was electric.

The latest type embodied the most modern motor-car practice, the depth of cut was between 4 and 8 ft., the gears were totally enclosed and had the most modern lubricating devices, and self-contained haulage would give cutting speeds up to 6 ft. per minute and flitting speeds up to 30 ft. per minute.

Compressed air was the more popular power for a number of years after electric power was introduced. The improvement of electrical plant, the increased margin of safety in operation, the reliability of the modern electric motor, the very much greater efficiency, and the very much lower cost of production of electric power, as compared with the cost of production of compressed air, had, however, completely reversed the position. The percentage of electrical plant used would be still higher, said Mr. Maitland, but for the fact that at some collieries where compressed air was used the life of the collieries was too short to warrant the cost of conversion, or the economic condition of the mining industry prohibited the capital outlay. Compressed air more than held its own, however, in very gassy mines, although the improved construction of electrical apparatus had resulted in its introduction at many collieries where it would not have been considered safe a few years ago; the introduction of remote control had increased its application further.

During the last ten years the electrical h.p. in use underground had increased by 56.5 per cent.; the number of electric longwall coal-cutters had increased about 93 per cent., whereas the number of compressed-air machines had increased only 51 per cent.; and the percentage of machine-got coal had increased from 12 to 28 per cent. The following were the chief reasons for that reversal of the proportions: the overall efficiency of compressed air from generation to utilisation was below 15 per cent., while that of electricity was between 65 and 70 per cent.; the average cost of compressed air was 1¼d. (for 1,000 cu. ft. of free air at 80 lb. per sq. in.), whereas the cost of electricity per kWh was about 0.85d.

In a paper read before the Institution of Mining Engineers in 1930 by Prof. D. Hay and Mr. N. E. Webster, which dealt with the economics and practical working of compressed air and electricity in collieries, it was stated that unquestionably electricity was from three to nine time more efficient than compressed air. Mr. Maitland added that, whilst cases varied within wide limits, it was his experience that compressed air would in normal practice cost from 2d. to 7d. per ton of coal drawn more than electricity, and that this severe handicap was encouraging the growth of electricity in British mines. The following were results of actual power-consumption tests on various makes of longwall coal-cutters:—

*Compressed air*:—

(1) The same machine cutting at different cutting speeds:—
28 in. per min.: 815 cu. ft. of free air per min. per sq. yd. cut.
38 in. per min.: 770 cu. ft. of free air per min. per sq. yd. cut.
54.7 in. per min.: 655 cu. ft. of free air per min. per sq. yd. cut.

(2) Two different makes of machine cutting on the same face:—
577 cu. ft. of free air per min. per sq. yd. cut.
687 cu. ft. of free air per min. per sq. yd. cut.

*Electric Power*:—

(1) Three different makes of machines cutting on the same face:—
0.315 kWh per sq. yd. cut.
1.640 kWh per sq. yd. cut.
0.550 kWh per sq. yd. cut.

(2) Two different makes of machine cutting on the same face:—
0.273 kWh per sq. yd. cut.
0.211 kWh per sq. yd. cut.

The first of those compressed-air tests and the last of the electrical tests were somewhat similar propositions, and could be compared. Taking an average of the three compressed-air readings, a consumption of 747 cu. ft. of free air per sq. yd. cut, at a cost of 1¼d. per 1,000 cu. ft. of free air per minute, cost 0.94d. per sq. yd. The average of the electrical readings was 0.244 kWh per sq. yd. cut, at 0.85d. per kWh, cost of 0.22d. per sq. yd. cut—a difference of more than four times.

In describing different types of machines the author said that one 12-in. coal-cutter, suitable for 440 volts, 50-cycle, 3-phase, had a starting-current momentary kick of approximately 120 amperes, which immediately dropped to approximately 12 amperes when the motor was running light. The normal working load in most cutting was 25/30 amperes, but if the cutting subject was fairly easy the running current would be 20/25 amperes, the full-load current being 38 amperes. The temperature rise of the machine after, say, six hours run at full load would be approximately 60 deg. The controller was a drum-type air-break switch, because an oil-immersed switch was subjected to oil cracking, which gave off a highly inflammable gas, and it was not recommended by H.M. mines inspectors.

The number of accidents in mines due to electrical plant during the last few years was extraordinarily small, compared with the number due to other causes; most of them could have been prevented by the efficient maintenance of the plant and the exercise of ordinary care. With the progressive diminution of risk there must be a tendency towards an increasing use of electricity underground. During the last five years the total electrical h.p. in use underground had increased 13.5 per cent., and there was every justification for the prediction of at least a corresponding increase during the next five years.

### Discussion.

**Mr. H. M. Morgans** said there was nothing like compressed air for giving a good blow, and he expressed a preference for it rather than electricity for face work; compressed air ventilated, but by the time it had cooled down to the temperature of the atmosphere about half the work that had been put into it was lost.

**Mr. A. C. Sparks** said that the overall efficiency of compressed air was nothing like 15 per cent. in a colliery, though in the case of a particular machine, such as a coal-cutter, it might be. Many collieries were obtaining power at very much less than 0.85d. per kWh, and would not look at that price. Another point to be borne in mind was compressed air's large pressure variation; electrical pressure drop was of nothing like the same extent.

**Mr. G. M. Harvey** believed that the statement that compressed air was the better power for conveyors applied to the shaker type, and he asked if it were the fact that the belt type was being so improved that it was gradually displacing the shaker for most services. Whilst electricity could be taken into the mine as far as possible and then used for driving a local air compressor, that proposition offered little advantage over a purely compressed-air system, because the greatest loss was in driving the machines. The fact that during the three years 1927 to 1929 some 15 deaths had be caused by trailing cables and plugs and only one by a coal-cutting machine indicated that the danger did not lie in the machine, but in the connections. If the regulation that a trailing cable should be examined at the beginning of every shift were of any use, half the trailing cables would be taken out of the pits straight away. Further, they were being repaired with unsuitable materials; to repair torn cab-tire sheathing properly one should vulcanise it.

**Mr. W. C. Maitland,** replying, said there had been a run on belt conveyors, but it had stopped, and they were not used so much at the face now as shakers were. Quite a number of managers in Scotland had told him that they did not intend to install any more belt conveyors, except where conditions necessitated their use; for instance, when going up-hill.

**Mr. E. E. Pickett** asked whether contactor panels for the

remote control of coal-cutters (which he presumed were totally enclosed) gave trouble owing to ionisation and lack of ventilation.

**Mr. N. V. Castling** suggested that if oil-immersed switchgear were suitably designed trouble due to oil cracking and the emission of inflammable gases should not occur. Too little thought appeared to be given to the method of trailing-cable connection to portable apparatus, and he urged that interlocks should be provided always to prevent the disconnection of a cable until the power had been cut off.

**Mr. J. R. Walton** (branch president) knew of several cases, particularly of coal-cutters, in which oil-immersed switches had given trouble. It was not merely a question of the cracking of the oil; the switches were handled by unskilled people; very often there was no definite "on" position, and the contacts became burned to a very bad extent; it was far more difficult to get at an oil-immersed switch than at an air-break switch on a coal-cutter. It was much more difficult to use d.c. than a.c. for remote control, and he did not think the facts concerning starting and full-load currents were fully realised. Certain colliery engineers believed they could not protect their motors adequately because of their high starting current, and often spoke of it as being eight times the running current. If Mr. Maitland's figures of 120 and 38 amperes for a 12-in. coal-cutter were correct, the problem was simpler than seemed to be imagined.

# Correspondence.

**Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.**

## Electrolysis and Rubber.

We read with considerable interest of the electrolytic phenomenon recorded by your correspondents in the issue dated January 30th, and as many of your readers have assumed that the cable referred to is what is popularly known as "C.T.S." and as our name is so associated with this type of cable as being the original manufacturers, we should like to have the opportunity of stating that we have been in communication with your correspondents, who very kindly have placed before us the fullest information surrounding the whole circumstances. In consequence we are able to state that the cable is not of our manufacture, and that it is not of that class of cable usually known as C.T.S., or tough rubber sheathed, but that it is of the "ite" class.

We are, nevertheless, particularly interested in endeavouring to arrive at a possible explanation of the cause of the electro-chemical disturbance, and we are of the opinion that the "sparks" were due to explosion of hydrogen gas liberated during the action of sodium and potassium elements on the moisture present. The sodium and potassium elements in their turn would be produced by electrolytic action upon sodium and potassium salts, which are common in plaster. The sticky mass of rubber was merely a product of the general reaction caused through the heat produced during the electro-chemical reaction. This heat is much in excess of the melting point of rubber.

We consider that the most probable explanation of the cause of the trouble is, in the first place, that the cable had suffered mechanical damage, however slight, but enough to permit of sufficient leakage to set up electrolytic action. Further, it does not follow that this phenomenon would be confined to any specific type of cable, as it is entirely dependent on electrolytic action, and given similar surrounding conditions these effects would be produced irrespective of the type of cable employed.

**St. Helens Cable & Rubber Co., Ltd.**

Slough, *February 16th*, 1931.

---

Referring to our letter in your issue of January 30th, the analyst's report on the cable mentioned is as follows:—

"A large deliquescent white mass adhering to cable adjacent to a break in the rubber. Mass was giving off a gas, and on stirring gave flashes of yellow flame.

"It was also mixed with sticky masses of rubber and a rust coloured incrustation. The exposed copper conductor was not corroded appreciably.

"The mass was strongly alkaline and soluble in cold water, giving a milky mixture. The filtrate from this indicated sodium hydroxide. The mass as a whole consisted of an intimate mixture of sodium hydroxide and carbonate iron oxide, calcium salts, and small amounts of silica.

"These results would indicate a fault in the cable, probably due to an iron nail, giving rise to a current in such direction as to make the copper wire the negative pole. The film of moisture on the wall would then be electrolysed, giving metallic sodium at the copper.

"Oxidation of this sodium in presence of more water would produce sodium carbonate as a flocculent mass. This in turn would partly protect any more sodium metal (the cause of the yellow flashes), the portions attacked forming caustic soda (sodium hydroxide). If a nail were in contact with either the copper wire or the mass of carbonate, &c., it would be rapidly eaten away as the 'anode' of a local 'cell.'

"The silica and calcium salts come from the material of the plaster and perhaps from the calour wash found in other parts of the cable."

It should be noted that the cable had been *in situ* under these adverse conditions for a period of five years, and has been the only system to withstand more than a year's test.

We are making a further inquiry as to the absence of sulphur compounds.

**Teesdale & Jones,**

W. I. JONES.

Swindon, *February 9th*, 1931.

---

## Birmingham's Frequency Change.

Your correspondent "Freedom" raises in your issue of February 6th a question which is of particular interest to consumers in the frequency change area. The Frequency Change Department strongly recommends consumers to adopt the lump-sum arrangement. In a circular issued by the Department attention is drawn to the fact that, while a consumer is allowed the full cost of the change-over, he will yet be in a position to order any make or size of motor he likes. To quote the actual circular ". . . thus an opportunity is given to the consumer, if he is so minded, to reconstruct the drives and lay-out of his works."

If by acting on these lines a consumer finds that the whole of the allowed lump sum is not expended, it does not necessarily follow that he has "made a profit." The consumer has carried out his change-over on the lines suggested by the Frequency Change Department, and any money over should be looked upon as the cash value of the 50-cycle plant yet to be purchased. When and how this surplus is spent should be left entirely to the discretion of the consumer.

**En Avant!**

*February 9th*, 1931.

---

Your correspondent "Freedom," in your issue dated February 6th, raises an interesting point in connection with the frequency change in Birmingham. He, in common with other factory owners, is no doubt looking to the frequency change as an opportunity to re-organise his plant. To quote his own figures, he says he has £1,500 worth of plant, by which I presume he means that £1,500 represents the cost of replacing his old plant by new. This sum would, of course, be paid by the Central Electricity Board if he replaces the whole of his plant. By re-organising he is able to discard a portion of his plant and only needs to replace £1,200 worth. If he does this, it is understood that he will only be paid for what he actually replaces, and the portion that he has discarded will be a dead loss to him as it has been rendered valueless by the change of frequency. This is obviously unfair, and I agree with him that he should have some compensation for the plant which he does not wish to replace. Otherwise there is no encouragement for factory owners to economise and much money will be spent unnecessarily.

**Economy.**

*February 16th*, 1931.

---

## Registered Electrical Contractors.

Your leader in the current issue of the ELECTRICAL REVIEW gives a little encouragement to the registered electrical contractor, and in the same issue is published a letter under the heading of "Electricity in Rural Areas." Surely the time has arrived when the N.R.E.I.C. should receive some official support. One so often hears from the supply authority: "We have no authority if it passes our test," &c. Apparently anything and everything is connected up to get additional load, regardless of the consequences.

The reputable firm obtains a few orders that are not placed on price or where technical information is necessary. The jobber carries out a vast amount of work in rural buildings, most of which have conductive floors, while many of them are

damp. He neglects the most elementary safety precautions, and the price is generally below the cost of skilled labour, let alone material and profit.

The writer has before him a letter headed "Newsagent, Tobacconist and Electrical Engineer" (we once thought it an eminent profession).

On visiting a works recently it was observed that a worker was not very clever at connecting up a 440-volt motor. The reply was "Well, you see he's a tinsmith by trade." We have others in the neighbourhood—blacksmiths, plumbers, watchmakers and cobblers—all electricians.

On inspecting a mansion, partly destroyed by fire (cause unknown?), it was found that dozens of additional lamps had been wired by a succession of chauffeurs over a period of twenty years, most of the additions being in flexible cord.

On rewiring another house it was found that some 60 lamps had been in use for a number of years, wired up with cotton-covered bell wire.

As a last example, work was in progress in a dairy. In this case the "electrical engineer" had used no conduit fittings to his pipes—nothing was earthed, and the dairyman was blithely swilling his stone floor, with 400 volts about the place.

And electricity is said to be dangerous—surely it is wondrous kind!

**Rustic.**

*February 16th*, 1931.

## The City and Guilds Examinations.

Although a workman should gain his certificate of proficiency on the work that he is called upon to do, there is no reason why we should not maintain the present standards for the electricians' "interim," "full," and "extra" certificates, respectively.

Modern electrical installation work, in so far as the wireman is concerned, is almost entirely practical. A good wireman is less in doubt, and is a safer (and sometimes a less costly) workman when in possession of the necessary elementary theory. With his practical experience, a little technical knowledge gives him greater reliance, especially when tackling trouble work. Moreover, it gives him that certainty of himself to try for the electricians' extra certificate—a condition electrical installation workers should aim for.

At this period of our evolution where overhead installation work is extending throughout the country, easing of conditions for electricians' certificates should not be considered. They can, however, be broadened to better cover modern practical aspects of installation, maintenance, repairs, testing, &c.

**William T. Taylor.**

London, N.7.
*February 17th*, 1931.

## Electric-furnace Elements.

We notice in your issue of February 6th, 1931, a report of a lecture at Leicester dealing with nickel-chrome elements for electric furnaces, in which the lecturer is reported to have said that strip elements were much better than wire.

We have found from long experience that a furnace must be constructed to suit each particular class of work which it has to produce, and the design of the elements must be varied as required. Long life and simplicity of replacement of elements are two of the most important features to be borne in mind. In our own case we use nickel-chrome heating elements of thick rod, grids, strip, and/or coils. Such a wide choice of heaters gives the greatest flexibility and enables electric furnaces to be supplied as may be best suited to the users' requirements.

**Wild-Barfield Electric Furnaces, Ltd.,**

J. E. ORAM.

London, N.7.
*February 10th*, 1931.

## The Benevolent Institution Committee.

As you have always very kindly granted us the facilities of your paper for bringing matters connected with this Institution before the members of the electrical industry, I am once again taking advantage of your generosity by asking you to give publicity to the opinions recently expressed by the members of my Executive Committee.

It has been arranged to hold the annual general meeting in April next, when, of course, the all-important body, the Council, which is to control the workings of the Institution for the following year, is elected.

With the enormous growth of the Institution during the past few years, it has always been our endeavour to make this governing body as representative of the whole industry as possible, and in continuation of this policy, my Committee have instructed me to invite nominations from members of the electrical industry for the seats on this Council, which will become vacant this year, and also to ask all the members who can to attend this meeting and voice any suggestions which they consider would further the interests of this Institution.

A great deal of work and time has for many years past been given in the interests of this Institution by the present members of the Council, and while perfectly willing to continue in their present positions, a great many of them feel that new inspiration and impetus could be given by the introduction of new blood and new ideas.

I have therefore been instructed to ask that nominations from members who are willing to give a small part of their time and energy to furthering the interests of this Institution by serving on the Council, be sent to me before the end of March, in order that I may include them on the agenda for the annual general meeting.

I shall be pleased to supply any further information if those interested will get in touch with me.

**J. T. Keeping,**

*Secretary*,
Electrical Trades Benevolent Institution.

9, Southampton Street,
London, W.C.1.
*February 11th*, 1931.

## Careers for Young Engineers.

Surely the position of "Despair" (in your issue of February 6th) should call for an optimistic rather than a pessimistic frame of mind. The thorough grounding in electrical engineering which he has received will with a little patience and perseverance almost certainly bring its reward.

Don't lose sight of the fact that the present difficult times through which we are passing cannot be prolonged indefinitely, and that more prosperous periods will almost certainly bring with them the call for sound engineers in many and varied branches.

In case "Despair" may feel inclined to pass this by as coming from one already comfortably settled in a good position, I should like to remark in conclusion that my case is almost an exact parallel of his, except that a further two years of the "bitter pill" of an unsuitable position is only tending to increase my endeavour to find a suitable one.

As for despairing at 21 years of age, well, the best advice I can offer is to memorise the following: "To strive, to seek, to find, but not to yield."

**Optimistic** (Graduate I.E.E.).

## Interference with Wireless Sets.

Now that all-mains wireless sets are becoming a common feature we find that a great many people are troubled with interference owing to other apparatus on the supply. For instance, in one of our streets a fish-and-chip merchant has a sign working on an interruptor for 10 or 15 seconds, and I understand that this is a source of annoyance to the wireless users within 100 yards radius. We ourselves have a street-lamp relay in the top of a post containing a hold-up coil and a contact and at times this seems to produce a worse effect even than the fish-and-chip sign, probably due to a slight chattering of the contact, although this is not sufficient to be noticeable on the lamp. In the same road the use of two small arcs for spotlights at a local music hall are also the subject of bitter complaint

I should like to hear whether we can be called upon to alter our own street-lighting apparatus and to substitute other apparatus which will not upset wireless reception. It would appear to me that the wireless enthusiasts, being the last comers, should arrange their apparatus so as not to be susceptible to this influence.

It would be interesting to obtain the views of your readers.

**H. Wilson.**

Ashford, Kent. *February 9th*, 1931.

## Safety in Earthing.

We must all sympathise in their personal loss with those who are concerned in a case reported to-day in the Press, and we must hope that some good will come out of the experience. According to the reports, a wireman laid a lead-covered cable in a house without taking the precaution of earthing the lead sheath, and without testing. The case therefore points to the need for care in ensuring the proper earthing of all exposed metal-work used in proximity to or surrounding electrical conductors.

It must be generally accepted that the greatest safety is obtained by having no bare metal-work on the outside of and in the neighbourhood of, electrical conductors; that is to say, by the use of suitable insulating framework throughout. Where this is impossible, however (as it is, for example, on water pipes, taps, on the lead sheath of a cable, on metal-tubing covering of wires, or on the metal of a kettle, a radiator, and many other electrical appliances), it is only earthing that effectively guards against the chance that any of this metal-work may accidentally become alive; one of the principal difficulties at the present time is not so much that of mechanical design and construction as the risk of inadvertent oversight in workmanship. Every piece of metal-work requires consideration, and the incident seems to raise the question of necessary precautions for securing the best safety factors in the extending uses of electricity.

**H. W. Clothier.**

Hebburn-on-Tyne,
*February 12th*, 1931.

[The case referred to is reported on p. 328 of this issue. It may be noted that a fixing screw was used so long as to pass right through the lead of the cable on to the live conductor.—EDS. ELEC. REV.]

## Wages in the Electrical Contracting Industry.

Having "said my say," I am loth to continue this correspondence, for it will not lead us very far, but I may be permitted to add that until the present agreement came into force I followed the old agreement for several years on both increases and decreases.

The 3s. is not a *burden*, but the reason for its imposition is altogether unsound. No justification for an increase on account of the increase in the cost of living exists to-day. In my opinion there was no need to disturb the old agreement—it functioned very well for both employers and men. The new one is, I feel, nothing more or less than a "wangle" to keep up prices.

**Hadsum.**

*February 10th*, 1931.

# Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

### 1929.

21,914. "Automatic electrical cut-out and safety fuse." J. Kral. July 16th, 1929. (Convention date not granted.) (341,856.)

22,315. "Means for sound recording." S. O. Cowper-Coles. July 20th, 1929. (Cognate application 23,199/29.) (341,842.)

25,293. "Control of electric motors." B. A. Wesche. June 5th, 1929. (341,933.)

25,335. "Apparatus for commutating currents in dynamo-electric machine windings." Akt. Ges. Brown, Boveri et Cie. August 31st, 1928. (318,247.)

25,759. "Regulation of the voltage of a power supply system or other a.c. circuit." Ferranti, Ltd., and E. D. T. Norris. August 23rd, 1929. (341,903.)

28,448. "Photo-electric systems of reproducing sound." L. Kescskemeti-Kaye and British Talking Pictures, Ltd. September 19th, 1929. (341,883.)

28,475. "Method of and apparatus for reproducing sound films." C. R. Blum. September 19th, 1929. (341,845.)

28,560. "Apparatus for electrolysis with mercury electrodes under pressure for the manufacture and production of hydrogen peroxide." J. Y. Johnson (I. G. Farbenindustrie Akt. Ges.). September 20th, 1929. (341,847.)

31,128. "Apparatus for photographically recording alternating currents." Selenophon Licht-und Tonbildges. October 25th, 1928. (341,848.)

31,300. "Process and apparatus for setting numerical values or other quantitative magnitudes electro-magnetically upon registering and calculating mechanism." G. Tauschek. October 22nd, 1928. (341,850.)

31,338. "Electric heating element." C. Sykes, W. Needham, and Associated Electrical Industries, Ltd. October 15th, 1929. (341,938.)

31,701. "Incandescent cathode rectifiers." Siemens & Halske Akt. Ges. October 27th, 1928. (341,911.)

31,933. "Reception of wireless signals." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 29th, 1928. (341,870.)

31,947. "Electrical resistances." British & Dominions Ferralloy, Ltd., and J. W. Bampfylde. October 21st, 1929. (341,872.)

32,072. "Electric furnaces." British Thomson-Houston Co., Ltd. October 24th, 1928. (341,946.)

32,157. "Electric clocks and the like." S. J. Smith, J. F. Grimbley, and Telephone Manufacturing Co. (1929), Ltd. October 23rd, 1929. (Cognate application 25,075/30.) (341,947.)

32,208. "Wireless transmitters." J. S. C. Salmond, G. Shearing, and W. Ure. October 23rd, 1929. (341,922.)

32,317. "Inspection lamps for motor vehicles." English Clock & Watch Manufacturers, Ltd., and H. N. Walford. October 24th, 1929. (341,953.)

32,448/9. Starting switches for electric motors." British Thomson-Houston Co., Ltd., and S. N. Bourne. October 25th, 1929. (341,962/3.)

32,507. "Induced current furnaces." E. Bornand and H. A. Schalaepfer. November 3rd, 1928. (341,967.)

32,510. "Illuminated sign." F. H. Scantlebury. November 3rd, 1928. (341,968.)

32,821. "Electric protective systems." A. Reyrolle & Co., Ltd., and H. Leben. October 29th, 1929. (341,985.)

32,822. "Electric protective systems." A. Reyrolle & Co., Ltd., and H. Leben. October 29th, 1929. (Cognate application, 14,458/30.) (341,986.)

32,951. "Totalisators." Ericsson Telephones, Ltd., and F. Limb. August 29th, 1930. (341,990.)

32,952. "Totalisators." Ericsson Telephones, Ltd., L. W. Smith, and T. Lyden. October 30th, 1929. (Cognate application 25,732/30.) (341,991.)

33,098. "Vapour-electric discharge devices." British Thomson-Houston Co., Ltd. October 31st, 1928. (341,995.)

33,278. "Electric discharge apparatus." British Thomson-Houston Co., Ltd. November 8th, 1928. (342,000.)

34,025. "Line-distributing systems for electrical signals." A. Warwick, J. A. A. Taylor, and H. C. Holmes. November 7th, 1929. (342,016.)

34,155. "Electrical coding and decoding devices." W. Korn. November 8th, 1928. (342,019.)

34,519. "Electric motor vehicles." Maschinenfabrik Oerlikon. November 24th, 1928. (Addition to 341,173.) (342,025.)

35,102. "Electric motor vehicles." Maschinenfabrik Oerlikon. December 14th, 1928. (Addition to 341,173 and 342,025.) (342,032.)

35,337. "Electromagnetic compasses." British Thomson-Houston Co., Ltd. November 19th, 1928. (342,038.)

36,312. "Electrical apparatus responsive to the synchronisation of alternating voltages." General Electric Co., Ltd., C. C. Garrard, and F. B. Willis. November 27th, 1929. (342,050.)

36,331. "Electromagnet systems." Siemens Bros. & Co., Ltd., and E. A. Forceville. November 27th, 1929. (342,051.)

36,492. "Galvanic cells." W. W. Triggs (National Carbon Co., Inc.). November 28th, 1929. (342,052.)

36,675. "Driving of picture-assembling devices of television and picture-receiving apparatus." V. Binder. November 29th, 1928. (342,054.)

36,712. "Infra-red sensitive cells." Telefunken Ges. für Drahtlose Telegraphie. December 1st, 1928. (342,055.)

36,932. "Aerial arrangements." Telefunken Ges. für Drahtlose Telegraphie. February 19th, 1929. (342,060.)

37,734. "Loud speakers for wireless telephony." O. D. Lucas. December 9th, 1929. (342,070.)

38,029. "Thermionic apparatus." British Thomson-Houston Co., Ltd. December 24th, 1928. (342,074.)

38,393. "Electric switches." R. H. Baker and C. W. Parson. December 14th, 1929. (342,082.)

38,648. "Circuit arrangements for neutralising extraneous signals in electrical communicating and signalling systems." K. V. Jorgensen. December 17th, 1929. (342,084.)

38,874. "Electric motor control systems." British Thomson-Houston Co., Ltd. December 18th, 1928. (342,087.)

### 1930.

271. "Means for preventing the freezing of condensed moisture in compressed air systems." Electro-Mechanical Brake Co., Ltd., and S. Smith. January 3rd, 1930. (342,097.)

1,135. "Electric plug-and-socket connections." B. W. Handley and G. B. Handley. January 13th, 1930. (342,110.)

1,889. "Electric control system for effecting and regulating the lateral movements of a displaceable part of a paper-filing device relative to a stationary part of the device." S. H. Liber. January 29th, 1929. (342,115.)

2,353. "Incandescent lamp for illuminating apparatus for photography." Korting & Mathiesen Akt. Ges. August 13th, 1929. (342,121.)

2,416. "Electric switches particularly outdoor switches." Associated Electrical Industries, Ltd. February 5th, 1929. (342,122.)

2,530. "Electrical temperature-regulating apparatus." Fabrik Electr. Apparate F. Sauter Akt. Ges. January 28th, 1929. (342,125.)

2,547. "Connecting devices for electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 7th, 1929. (342,126.)

2,690. "Electric stop-motion devices for textile warping apparatus. W. Reiners. February 9th, 1929. (342,128.)

2,936. "Electrothermal overload switches." C. W. Kuhn. June 24th, 1929. (342,133.)

3,704. "Electric fuses." J. A. Crabtree. February 4th, 1930. (342,147.)

3,731. "Means for the electric operation of railway points or switches." Cheatham Electric Switching Device Co. February 4th, 1929. (342,148.)

3,911. "Air-break electric switches." Associated Electrical Industries, Ltd. February 6th, 1929. (342,150.)

4,246. "High-frequency generators and apparatus for use therewith." Marconi's Wireless Telegraph Co., Ltd. April 15th, 1929. (342,155.)

4,340. "Contact devices for electric alarm signal installations." L. Rado. November 27th, 1929. (342,157.)

7,719. Electric switches." S. S. White Dental Manufacturing Co. November 1st, 1929. (342,183.)

9,365. "Projector lamps." Hall & Connally, Inc. March 26th, 1929. (342,204.)

9,780. "Apparatus for recording or reproducing sound." British Thomson-Houston Co., Ltd. March 27th, 1929. (342,209.)

10,489. "Protective devices for electrical transformers and other electrical translating devices." Associated Electrical Industries, Ltd. April 3rd, 1929. (342,210.)

11,778. "Devices for controlling the commutator brushes of electrical machines." Dr. H. Berchtenbreiter. April 14th, 1930. (342,215.)

12,281. "Protection of networks against excess voltage in relation to earth potential." Compagnie Générale d'Electricité. May 1st, 1929. (342,217.)

12,848. "Light valves." Marconi's Wireless Telegraph Co., Ltd. May 23rd, 1929. (342,219.)

13,190. "Thermionic valves or electron-discharge tubes and holders therefor." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 3rd, 1930. (342,220.)

13,339. "Arrangements for the remote control of electrically operated apparatus such as indicating apparatus for railway track switches." General Railway Signal Co. May 16th, 1929. (342,221.)

13,680. "X-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 16th, 1929. (342,222.)

13,782. "Electrical resistances." H. A. Gill (Steatit-Magnesia Akt. Ges.). May 5th, 1930. (342,223.)

13,789. "Bi-metallic regulators." International General Electric Co., Inc. May 4th, 1929. (342,224.)

15,655. "Apparatus for high-tension electric transmission lines." British Thomson-Houston Co., Ltd. May 21st, 1929. (342,234.)

18,590. "High-voltage cable installations." Felten & Guilleaume Carlswerke Akt. Ges. August 20th, 1929. (342,243.)

19,171. "Electric insulators of ceramic material." F. Singer. September 3rd, 1929. (342,244.)

20,090. "Synchronising apparatus." British Thomson-Houston Co., Ltd. July 16th, 1929. (342,245.)

22,631. "Rheostats." British Thomson-Houston Co., Ltd. July 27th, 1929. (342,246.)

### 1931.

864. "Electrical train-influencing systems." Vereinigte Eisenbahn Signal Werke Ges. August 4th, 1928. (Divided application on 316,868.) (341,896.)

# Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 11th:—

Tag (lettering and design). No. 514,823. Class 8. Pyrometers, &c.—Charles J. Tagliabue Manufacturing Co., Brooklyn, N.Y., U.S.A. (British representatives: White, Langner, Stevens, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.2.)

Dentalix, No. 515,204, and Rotalix, No. 515,206. Class 8. Electric discharge tubes, &c.—Naamlooze Vennootschap Philips' Gloeilampenfabriek, Holland. (British representatives: Boult, Wade & Tennant, 112, Hatton Garden, E.C.1.)

Sonodyne. No. 515,347. Class 8. Radio-receiving sets in combination with gramophones.—A. D. Jones, trading as Jones & Stewart, 247a, St. Vincent Street, Glasgow.

O (lettering and design). No. 517,531. Class 8. Electric batteries and accumulators (not for medical purposes).—Oldham & Son, Ltd., 36, Hyde Road, Denton, Manchester.

Televisaphone. No. 518,892. Class 8. Apparatus for use in transmitting images and scenes or sounds to a distance by telegraphy or telephony.—Baird Television, Ltd., 133, Long Acre, W.C.2.

Ferbatco. No. 519,348. Class 8. Cells for electric batteries.—Ferguson Battery Co., Ltd., 54, Old Broad Street, E.C.2.

Duplexalite (lettering and design). No. 500,128. Class 13. Electric light fittings and fixtures.—Miller Co., Meriden, Conn., U.S.A. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Cobble. No. 518,470. Class 18. Electric and gas heating and cooking apparatus.—Radiation, Ltd., Aston, Birmingham.

## Frequency Standardisation in France.

A resolution was passed recently at a meeting of the Association Générale des Hygienistes et Techniciens Municipaux that frequency uniformity was most desirable, and that the frequency of 25 cycles should be rigorously suppressed for lighting purposes. The existence of at least three frequencies in France (25, 42 and 50 cycles) was troublesome and complicated, and made interconnection practically impossible, while 25 cycles was hurtful to the eyes. It was strongly recommended that 50 periods should be adopted exclusively in France.

# New Work for Contractors.

**Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.**

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

---

BATTLE.—Restoration of Battle Abbey, electrically equipped; Mr. Jacoby.

BEVERLEY.—Houses (125) for the T.C.; borough surveyor.

BILLINGHAM.—Houses (100) for the U.D.C.; Kitchen and Co., architects, 21, Albert Road, Middlesbrough.

BLACKPOOL.—Hotel, South Promenade (£12,000); Catternall & Swarbrick.

BOOTLE.—Houses (57), Aintree Road (£19,262); Lloyd and Cross, Ltd., Birkenhead.

BOUGHTON (FAVERSHAM).—Hotel for Shepherd, Neame and Co.; Harold Anderson, architect.

BRADFORD.—Infants' school, Westfield Lane; city architect.

BRENTWOOD.—Hospital for the District Hospital governors; secretary.

BRISTOL.—Reconstruction of premises, Castle Street (£25,000); F. W. Woolworth & Co., Ltd. Secondary school, Portway (£231,000); W. Cowlin & Son, Ltd.

BROMLEY (KENT).—School and medical clinic, Bromley Common (£42,000); extensions, Aylesbury Road Schools (£15,634), for the borough E.C.; director of education.

BROMSGROVE.—Hospital; Worcestershire county architect.

CARLISLE.—Lonsdale Picture House for Sidney Bacon & Co.

CROWBOROUGH.—Electric lighting installation, Christ Church; rector.

DARTFORD.—Additions, cinema, Lowfield Road; Medway Cinemas, Ltd.

DOUGLAS (I. OF M.).—Houses, Colden Road; L. Corkill and Co.

DURHAM.—Council school, East Rainton (360 places); F. Willey, architect, 34, Old Elvet.

ECCLES.—School, Winton, for the borough E.C.; director of education.

EDINBURGH.—Housing scheme, Granton Mains Farm site; city architect. Library buildings, Sheriff Courthouse site; trustees, National Library.

EPSOM.—Houses and flats for the U.D.C.; H. R. Gardner, architect. Houses (60), Wells estate, for Fernlea Building Co., Ltd.

GAINSBOROUGH.—Houses (250) for the U.D.C.; surveyor.

GATESHEAD.—Offices for John Powell & Son, Ltd.; J. Gouldings & Son, builders, Simpson Street.

GLASGOW.—Cinema (3,000 seats); A. V. Gardner, architect.

GRAVESEND.—Houses (200), Denton estate, for the T.C.; borough surveyor.

HENLEY-ON-THAMES.—Bazaar premises, Bell Street, for F. W. Woolworth & Co., Ltd., Kingsway, London, W.C.1.

HUDDERSFIELD.—Houses (64), Dalton, for the T.C.; borough architect.

INVERNESS.—Houses (84) for the T.C.; burgh surveyor.

IPSWICH.—Clearance scheme and 200 houses (£82,000); borough engineer.

IRISH FREE STATE (ROSCOMMON).—Secondary schools; G. L. O'Connor, architect, 27, Dawson Street, Dublin.

KIDDERMINSTER.—Cinema theatre for the Kidderminster Central Theatre, Ltd. (£18,200); A. J. Crump & Sons, Ltd., builders, Dudley.

LAMPETER.—Maternity hospital; Cardiganshire C.C. Assistance Committee.

LANARKSHIRE.—Houses (152), Baillieston, East Kilbride, and Cambuslang, with electrical work, for the C.C.; P. C. Smith, architect, District Offices, Hamilton.

LEEDS.—Extensions to schools for the Rev. Father P. Vermeire, of St. Patrick's; Empsall, Clarkson and Clarke, architects, Permanent Chambers, Piece Hall Yard, Bradford.

LEICESTERSHIRE.—Elementary school (500 places), Coalville, for the county E.C.

LINCOLNSHIRE.—Schools, Caistor and Epworth, for the Lindsey E.C.; director of education, Lincoln.

LIVERPOOL.—Church for Very Rev. V. M. Mayer; Anthony Ellis, architect, The Temple, Dale Street. Factory premises for Brown & Rowcliffe, Ltd.; F. W. Gale, builders, Linacre Lane.

LONDON (CHELSEA, S.W.).—Widening of Chelsea Bridge (£659,000); L.C.C. engineer.

(CLAPHAM, S.W.).—Flats (72), King's Avenue; H. Wakeford & Sons.

(VAUXHALL, S.W.)—Extension, Central School (£12,200); L.C.C. architect.

(WESTMINSTER, S.W.).—Extensions, St. Martin's Art School (£10,700); L.C.C. architect.

MANCHESTER.—Alterations and extensions, Didsbury Hotel; G. Westcott, architect, 13, Bridge Street, Extensions to premises of United Yeast Co., Ltd., 80, Miller Street; G. Bradbury & Sons, architects, 14, Cook Street, Liverpool.

MONMOUTH. — Housing scheme, Wyesham; borough engineer.

ORMSKIRK.—Houses (88) for West Lancashire R.D.C.; R. Rosbotham, surveyor, Townend.

PEDMORE.—Hospital; E. Stevens, Prescott House, Stourbridge.

PLYMOUTH.—Housing scheme (30 acres), St. Budeaux. Secondary school (£55,000) and senior school, Mount Street; borough architect.

PORTSMOUTH.—Municipal aerodrome, second section; city engineer. Alterations, Majestic Cinema, Kingston Road; R. W. G. Stokes.

REIGATE.—Extensions, poor law institution; A. Saxon Snell and Phillips, architects, 9, Bentinck Street, London, W.1.

RETFORD.—Houses (50) for the T.C.; borough surveyor.

RICHMOND (SURREY).—Extensions, poor law institution; D. Mathews, Son & Ridley, architects, 3, Paul's Bakehouse Court, E.C.4.

ST. HELENS (LANCS.).—Houses (300), Knowsley Road, for the T.C.; borough surveyor. School, Lascelles Street and South John Street, for the vicar and wardens of Holy Trinity Church; G. Bradbury & Sons, architects, 14, Cook Street, Liverpool.

SALE (CHESHIRE).—Extensions to Town Hall and Library, Tatham Road, for the U.D.C.; Adshead, Topham and Adshead, architects, 14, St. Anne's Square, Manchester.

SCUNTHORPE AND FRODINGHAM.—Houses (100) for the U.D.C.; surveyor.

SOUTHPORT.—Houses (160) for the T.C.; borough surveyor.

STOCKPORT.—School, Southwood Road, Great Moor; director of education.

SURREY. — Schools, Beddington (£16,120); Chipstead (£13,300); East Molesey; and Woking (£21,700), for the county E.C.

WALSALL.—Baths (£55,950); borough engineer.

WARRINGTON.—Extensions to General Hospital (£79,300); governors. Elementary school, Fairfield Hall site, for the E.C.

WARWICK.—Extensions, county offices (£10,718); W. W. Webster.

WEST RIDING.—School, Mexborough, for the county E.C.; education architect, Wakefield.

WILLENHALL (STAFFS.).—Municipal offices and fire station, Walsall Street (£16,400); U.D.C. surveyor.

WORCESTER.—Extensions to general infirmary; governors.

WORTHING.—Houses (500) during the next five years for the T.C.; borough surveyor.

YORK.—Houses (150), Grange estate; city architect. Houses (110), Huntingdon Road, for the T.C.; city engineer.